ELECTRICAL WEST

JUL 21 1943

THE ALL-INDUSTRY MAGAZINE OF PROGRESS

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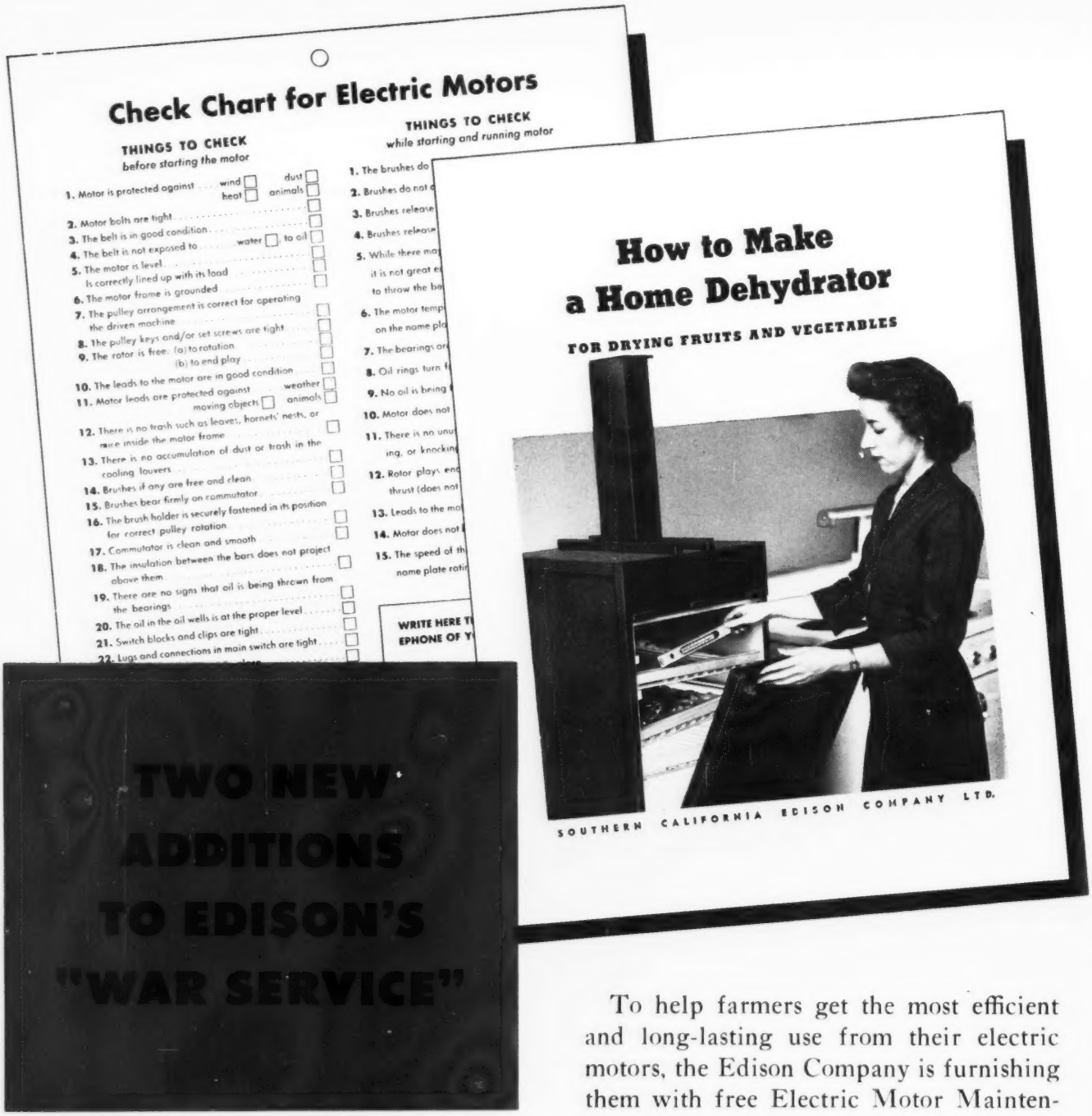
WAR BONDS
D STAMPS
VICTORY

JULY, 1943

Providing the 15,000,000 kilowatt hours of cheap electricity needed every day by Southern California's busy war plants, military centers, farms, homes and business establishments is the Edison Company's biggest, most vital war job. But this is not the only way in which Edison is serving the war effort.

To help farmers get the most efficient and long-lasting use from their electric motors, the Edison Company is furnishing them with free Electric Motor Maintenance Check Charts.

Plans and information for building and operating home-made dehydrators to preserve fresh fruits and vegetables also have been prepared for the benefit of Edison customers.

Today, as always, Edison service is *more* than electrical service.

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

★ WASTE IN WAR IS A CRIME . . . DO NOT WASTE ELECTRICITY JUST BECAUSE IT IS NOT RATIONED.

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The Transformer THAT MADE THE Load-center Unit Substation Possible

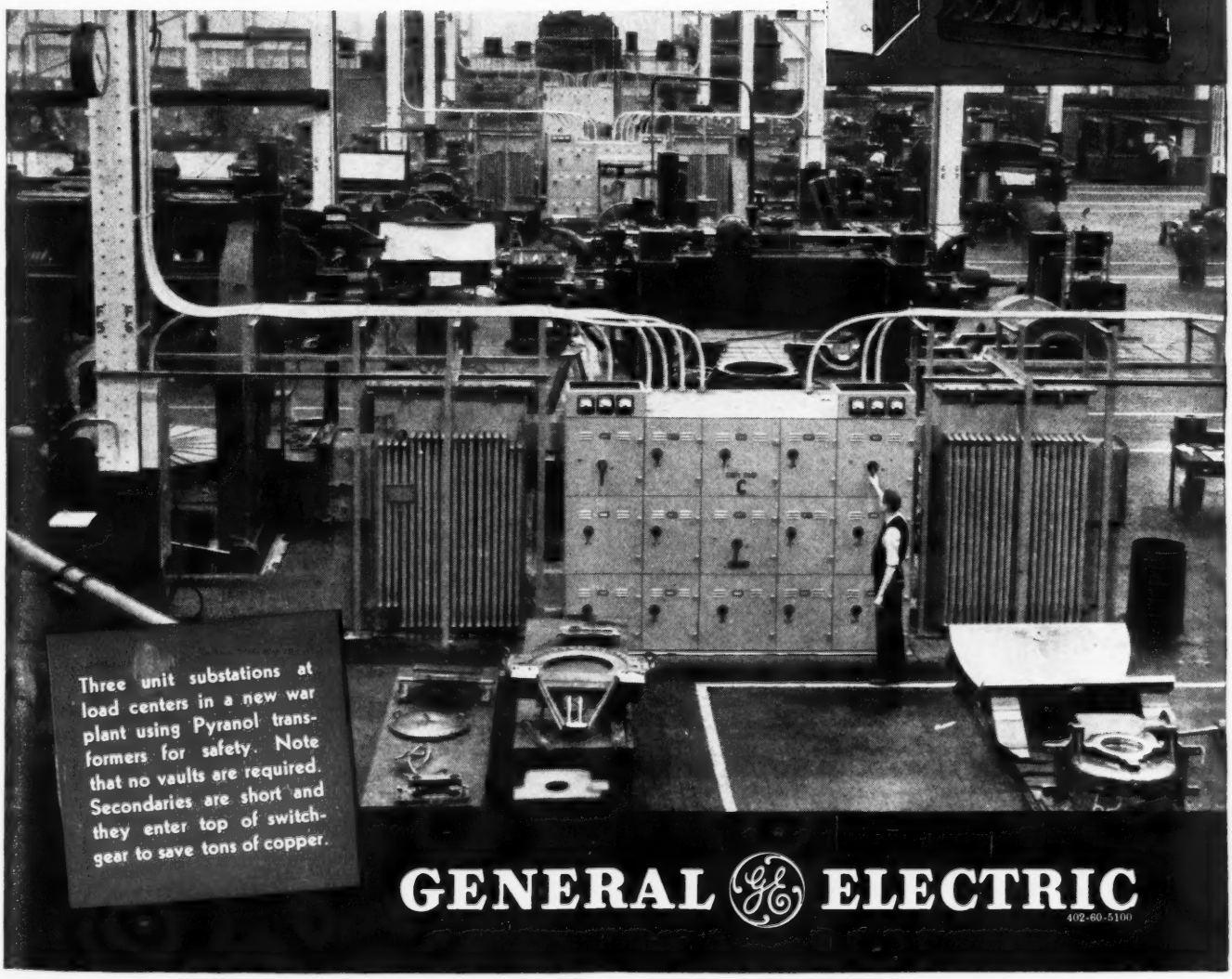
THE inherent safety of Pyranol* transformers led to the development of the modern load-center system of power distribution. It made possible the basic element of such a system, the load-center unit substation.

In turn, these easy-to-order, easy-to-install unit substations enable war plants to get rolling months sooner than would be possible otherwise. And because Pyranol transformers permit installation in or near the working areas, the elimination of long secondaries is saving thousands of tons of copper. Power losses are reduced, and voltage regulation is improved.

Remember, too, that Pyranol transformers are ***all-purpose*** units. Whether or not unit substations are called for, Pyranol permits installation anywhere you wish, indoors or outdoors, above ground or underground, in places wet or dry, clean or dusty. Whatever location you choose, these transformers will simplify your installation problem, and will supply the power for your war loads with little or no maintenance. Write for Bulletin GES-2974. ***General Electric, Schenectady, N. Y.***

*Reg. U.S. Pat. Off.

- - - the All-purpose PYRANOL TRANSFORMER for Safety and Savings



Three unit substations at load centers in a new war plant using Pyranol transformers for safety. Note that no vaults are required. Secondaries are short and they enter top of switchgear to save tons of copper.

GENERAL ELECTRIC

402-60-5100

Here in the WEST

People

E. W. Morris

who writes of 3-phase transformers, p. 44, has been with Westinghouse in Los Angeles since 1925. Since June 1941, he has supervised the company's district engineering and service department there. A native of Nebraska and an electrical engineering graduate of the state university, he took the Westinghouse student course at East Pittsburgh, was transferred to Los Angeles soon after. He has helped engineer major power projects and industrial installations in the southwest. For seven years, he has taught classes in industrial electronics to more than 600 engineering students at California Institute of Technology, Pasadena, U.S.C. and at industrial plants in the area.

W. H. Schiek

who tells about unit substations, p. 47, is a native of Schenectady, N. Y. and attended the Drexel Institute of Technology. Following graduation in 1934, he joined General Electric at Philadelphia, moved to Schenectady in 1935. He was assigned to the San Francisco office as switchgear specialist in 1941 and in the same capacity at Los Angeles in 1942. His father, B. F. Schiek, has been a switchgear design engineer with G-E for 35 years, a fact which encouraged the son's interest. Mr. Schiek Senior is now in Philadelphia.

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Fontana plant of Kaiser Co. is new chapter in West's industrial growth.

German Power Dams Breached 41
Details of RAF bombing of Ruhr district dams.

3-Phase Transformers Save Copper and Steel .. 44
By E. W. Morris—Higher efficiency, lower cost, smaller dimensions and lighter weight additional advantages.

Load Center Unit Substations 47
By W. H. Schiek—Factory-assembled equipment provides speed and reliability for today's war plants.

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Preview

Speed the Rod

and spoil the Axis is the way Columbia Steel, at Pittsburg, Calif., feels about it now with a new continuous rod mill. What makes this mill interesting electrically is the thorough way in which its operations are synchronized by means of electrical control and electric drive. This inside view of a modern Western steel mill, rare these days, will be presented in the next issue. Later in the year a story, if not several, about Columbia's huge new steel plant at Geneva, Utah, has been arranged for. With the plant described in this issue, the steel future of the West seems assured, serving the expanding war industries now, the converted peacetime needs for steel in the future.

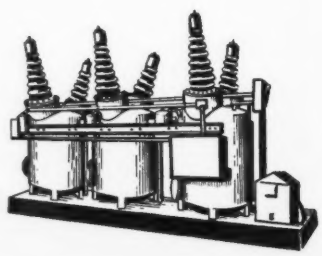
Wire and Insulations

are the most uncertain things in the electrical business these war days. Although no substitute has been found for copper as a conductor, anything from last year's hat to chewing gum is apt to show up as insulation. Just what the situation is was told to inspector associa-

tion meetings in Denver, Great Falls and Salt Lake City recently. That paper will be printed next issue too.

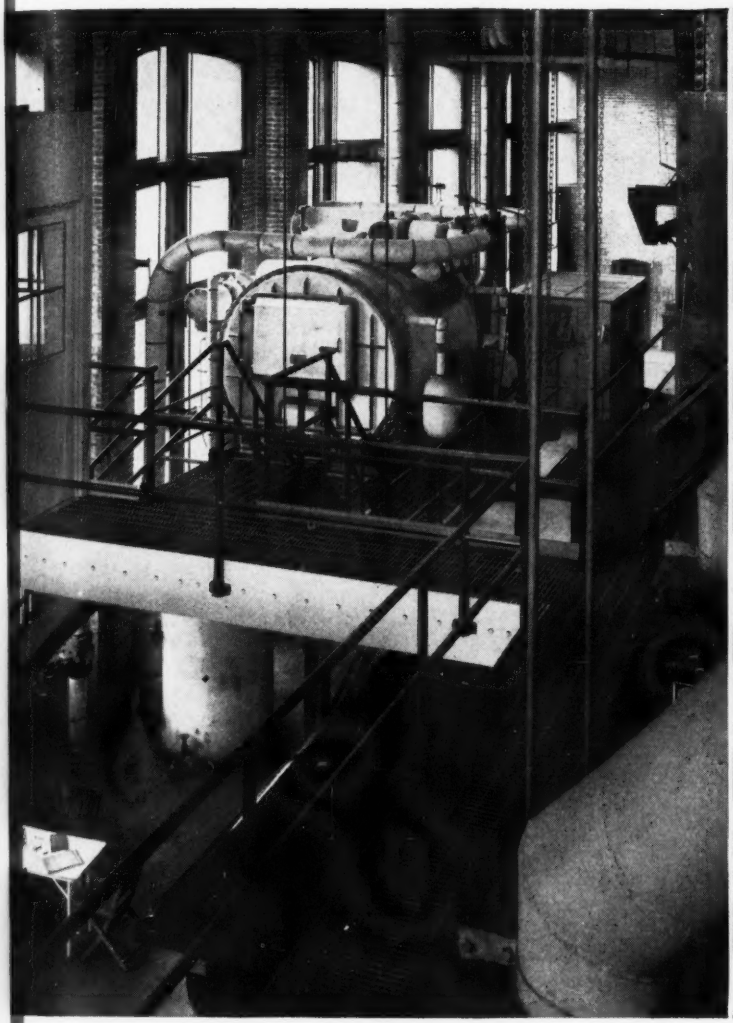
Circuit Opening

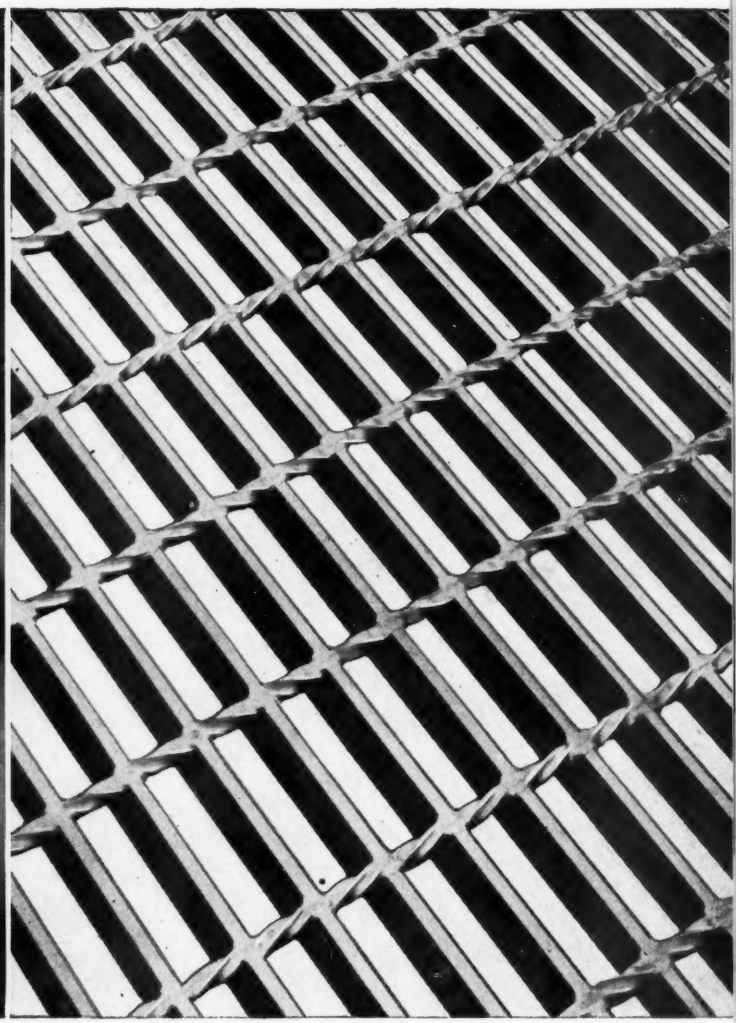
on the source side of 60-kv. substation transformers has advantages in system protection from transformer failures, bus shorts, etc. Since 60 kv. lines are now used freely in distribution to expanding war loads and no longer considered in the big transmission line class, economical circuit opening, as discussed next month herein, becomes the primary consideration for utilities in selection of equipment.



ON THE GROUND...OR HIGH ON A CAT-WALK

THE TWISTED BAR MEANS SAFETY





SAFE, because the twisted bar prevents slipping . . . and STRONG, because it's electroforged into one solid piece. Whatever your grating needs, you can depend on Blaw-Knox!

BETTER . . . 5 WAYS

1. Self-cleaning, no sharp corners to clog.
2. Maximum open area for light and air.
3. Easy to maintain . . . paint reaches entire surface.
4. Strong electroforged construction means easy erection.
5. Safe footing at all times . . . with twisted cross bar.

A Catalogue and paper weight size sample will be sent upon request made on a firm letterhead.

BLAW-KNOX STEEL GRATING

BLAW-KNOX DIVISION OF BLAW-KNOX CO.
2044 FARMERS BANK BLDG. · PITTSBURGH, PA.
NEW YORK · CHICAGO · PHILADELPHIA · BIRMINGHAM · WASHINGTON
Representatives in Principal Cities

Design for Lighting—Today and Tomorrow

● Simple and modern in design, the new Sylvania fluorescent fixture meets all normal industrial lighting requirements.

It is another fluorescent first for Sylvania – this all-purpose standardized fixture of the future.

The streamlined top-housing, which weighs less than three pounds, encloses the ballast and protects it from dust.

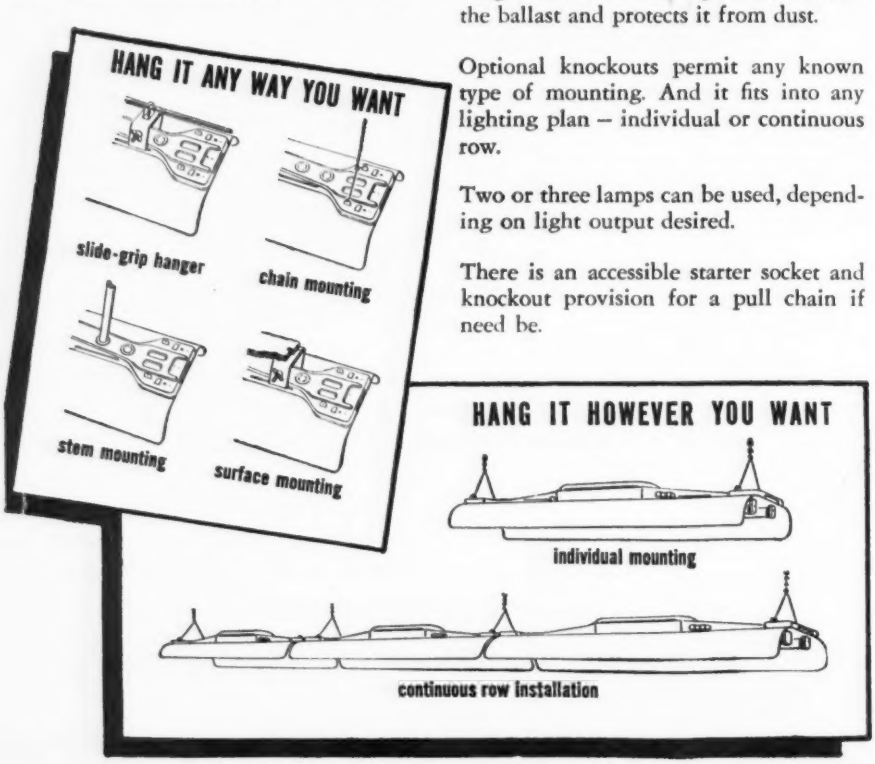
Optional knockouts permit any known type of mounting. And it fits into any lighting plan – individual or continuous row.

Two or three lamps can be used, depending on light output desired.

There is an accessible starter socket and knockout provision for a pull chain if need be.

The fixture is equipped with a light and durable composition reflector that has a designed-in efficiency of 86 per cent – even higher than that of porcelain-enameled metal in conventional contours. This reflector stands up under extreme temperature and humidity conditions. "Captive Latch" fastenings that require no tools for removal make it easy to service.

The Sylvania fixture of the future is available in 40-watt and 100-watt lengths. It carries Underwriters' Laboratories approval and our own 90-day guarantee. And it meets governmental requirements in every particular. For full details, write Dept. M&F 7.



SYLVANIA

ELECTRIC PRODUCTS INC.

Formerly Hygrade Sylvania Corporation
Ipswich, Mass.

INCANDESCENT LAMPS, FLUORESCENT LAMPS, FIXTURES AND ACCESSORIES, RADIO TUBES, ELECTRONIC DEVICES.

NOW available HAZAPAK RUBBERLESS WIRE

a New BUILDING WIRE That Conserves Critical Materials!

SAVES RUBBER
•
SAVES TIN
•
SAVES CRITICAL SYNTHETICS
1. Bare copper conductor.
2. Kodapak (cellulose-acetate butyrate) tape insulation.
3. Moisture - proof compacted kraft paper cushion.
4. Dilec flame and moisture - resistant covering.
14 - EI - 600 V - HAZARD
UL

HAZAPAK Rubberless Building Wire, approved by the Underwriter's Laboratories, Inc., is now available for use as a building wire for lighting and power circuits. Its insulation and protective coverings contain no critical war materials.

HAZAPAK Rubberless Building Wire conductors are first insulated with a sealed layer of Kodapak synthetic tape over which is wrapped a further protective covering of moisture-proof, crumpled kraft paper. This insulation (full N.E.C. thickness), is then covered with a Dilec flame and moisture-resisting wrap. It consists of a cotton wrap with full coverage of cotton threads wound on spirally with several threads wound on in the opposite direction, binding the cotton tightly to the wire and forming a smooth, fully-covering sheath slightly smaller in diameter and smoother than a braid.

HAZAPAK Type EG Building Wire is approved as the neutral grounded conductor in common AC circuits and as the "white" conductor in cable assemblies such as Hazardex, armored cable, twin lead encased, etc., where the W.P.B. Rubber Restriction Order prohibits the use of rubber insulation on the white or grounded neutral conductor.

HAZAPAK Type EI Building Wire is approved for single conductor in open wiring as a wartime alternate for rubber-insulated wire, and as the "hot" wire in non-metallic sheathed cable that is run exposed in dry locations. It is available in any of the standard building wire colors.

The use of Types EG and EI HAZAPAK Rubberless Wire is covered by Interim Amendments Nos. 44 and 69 to the 1940 National Electrical Code.

Consult our nearest office for details about this new type building wire or ask your wholesaler about HAZAPAK.

ARMY E NAVY

HAZARD INSULATED WIRE WORKS
Division of The Okonite Co.
WILKES-BARRE, PA. Offices in Principal Cities.

HAZARD Electrical Wires and Cables

Salvage Your Scrap — Buy U. S. War Bonds

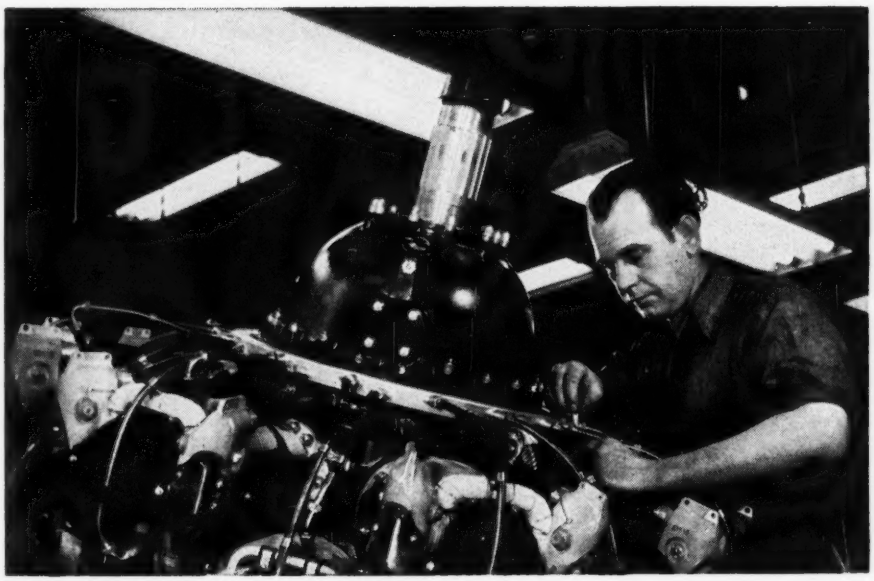
3324

"SEE-ABILITY" helps

Off the line—ahead of time! "See-ability" through modern lighting saves time in assembly, inspection, and final test.

s build motors faster

Motors are coming off the lines, faster and faster... each a promise of Victory—ahead of schedule. • To insure the success of this vital war work, millions of Westinghouse Mazda lamps are needed daily—needed to provide better "See-ability" for all our workmen in foundries, machine shops, in production and inspection departments everywhere! To make these lamps available, we must draw upon limited supplies of nickel, copper, tungsten. • That's why, in our advertising, we are asking all users to conserve their lamps, to help stretch further the nation's supply of critical materials. Westinghouse Electric & Mfg. Co., Lamp Division, Bloomfield, N. J.



"SIGHT FOR VICTORY" PROGRAM

Everyone interested in speeding our war effort through improved "See-ability" for war workers, can help by cooperating with the National Better Light—Better Sight Bureau's *"Sight for Victory"* Program. For full details, write Westinghouse Electric & Manufacturing Co., Lamp Division, Bloomfield, N. J., or get in touch with the Better Light—Better Sight Bureau, 420 Lexington Ave., New York, N.Y.

Westinghouse

MAZDA LAMPS

FOR GREATER "SEE-ABILITY"

RE-LIGHTING
the new manpower / production *requirement*

HERE'S ONE ANSWER
to this problem...

This new folder tells the whole story. Send for it!

Because most plants operating today were designed for peacetime, *daylight* working schedules, *their lighting equipment is inadequate for night work!*

The folder illustrated gives one answer to industry's problem of *re-lighting*. Silv-A-King's new fluorescent reflectors of non-critical, metal-saving Silv-A-Tex are durable, efficient, inexpensive, and available for prompt delivery. For complete descriptions and specifications of Silv-A-King "Victory" units, write for a copy of "Catalog 43-V" today!

SILV-A-KING
MAKES *Light* WORK FOR YOU

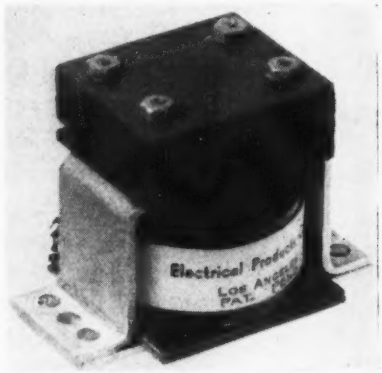
BRIGHT LIGHT REFLECTOR COMPANY, INC.
312 Morgan Avenue, Brooklyn, N. Y.

BROILKING AFTER THE WAR, MORE THAN EVER *America's Finest Electric Table Broiler*
INTERNATIONAL APPLIANCE CORPORATION
1027 Metropolitan Avenue, Brooklyn, N. Y.

PRODUCTS
that are news

Midget Relay (700)

Electrical Products Corp. has announced a midget relay incorporating a "sealed chamber" as a safety feature. The sealed chamber serves as arc quench and reduces fire and explosion hazards, according to the manufacturer, who states that the new



relay, while rated at 25 amp. operates satisfactorily at 50 amp. and has tested without failure at 120 amp. high inductive load.

Overtravel spring is said to insure positive contact pressure and instant "break" release, and to be tamper-proof. Reversible contacts are another feature listed. It is reported that the unit has withstood Army tests, including overload, vibration 55 cycles per second with .06-in. excursion, acceleration of 10 gravity units, salt spray tests of 240 hours.

Motor Starter (701)

As an addition to its industrial line, Allis-Chalmer Mfg. Co. has announced the Type H motor starter, which it claims was built especially to withstand wartime operating conditions. The new starter is a metal-enclosed structure similar to metal-clad switchgear. High interrupting capacity disconnecting type fuses are utilized in combination with a heavy-duty oil switch. This control has been designed for both induction and synchronous type motors rated up to 1,000 hp at 2,300 volts and 1,750 hp. at 4,600 volts, three-phase, 60 or 50 cycles.

Uses cover full or reduced voltage starting, dynamic braking, reversing and special applications, it is stated. Short circuit protection up to 160,000 kva. at 2,300 volts and 320,000 kva. at 4,600 volts is said to eliminate the need for a back-up breaker within those kva. ratings. Disconnecting type fuses combining high interrupting capacity with fast clearing action hold short circuit currents to safe values which do not damage the control, it is stated. Fuses operate only under actual short circuit conditions.

Rack-Type Connector (702)

Cannon Electric Development Co. has added a connector to its DP line, DP-B10C2, a rack type connector adapted to radio rack assemblies, transmitters and general applications where both plug and receptacle must be fixed permanently in their respective units of equipment.

Before
After
THREE 3-POLE CIRCUITS AND OBSOLETE OPEN TYPE MAIN SWITCH
TWELVE 3-POLE CIRCUITS AND PROVISION FOR TEN ADDITIONAL . . . SAME BOX, SAME CONDUIT

Here is the easy, economical way to provide for increased power demands

● Increased production has brought the demand for more power distribution in scores of plants. There are countless fusible panels similar to the one shown at the left above—inadequate and subject to excessive heating.

Notice how easy it is to convert to a compact, dead front circuit breaker panel. Notice, too, that by utilizing thin wall wire, additional circuits have been provided, using existing box and conduit.

Your nearest Square D Field Engineer will be glad to work with you in determining your exact requirements for speedy, economical conversion.

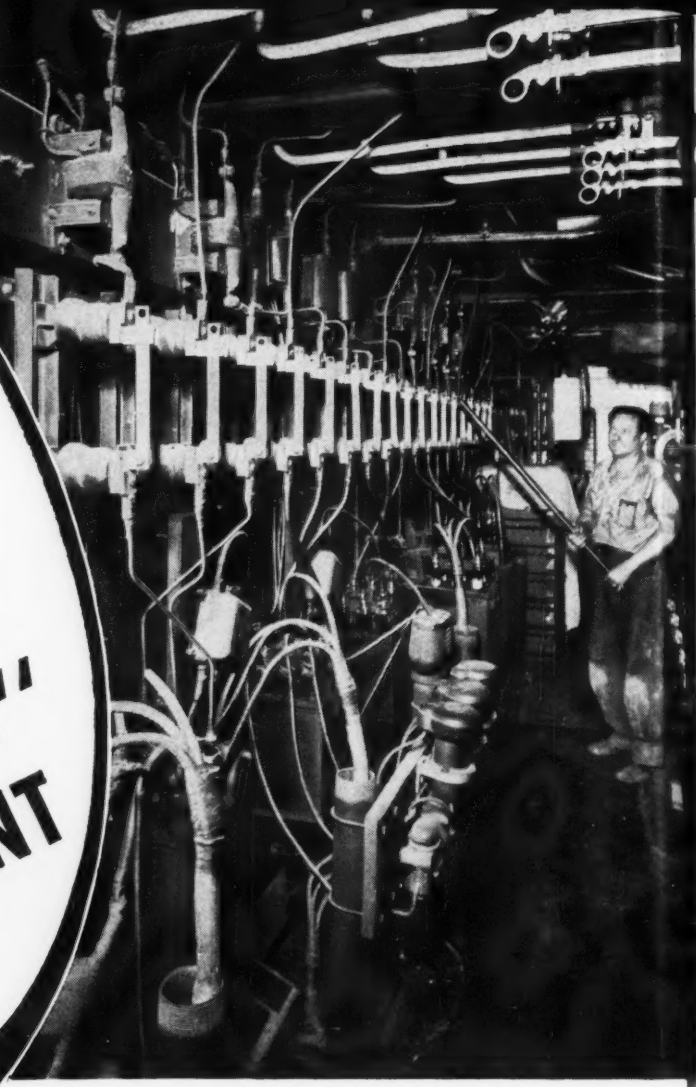
ELECTRICAL EQUIPMENT • KOLLSMAN AIRCRAFT INSTRUMENTS

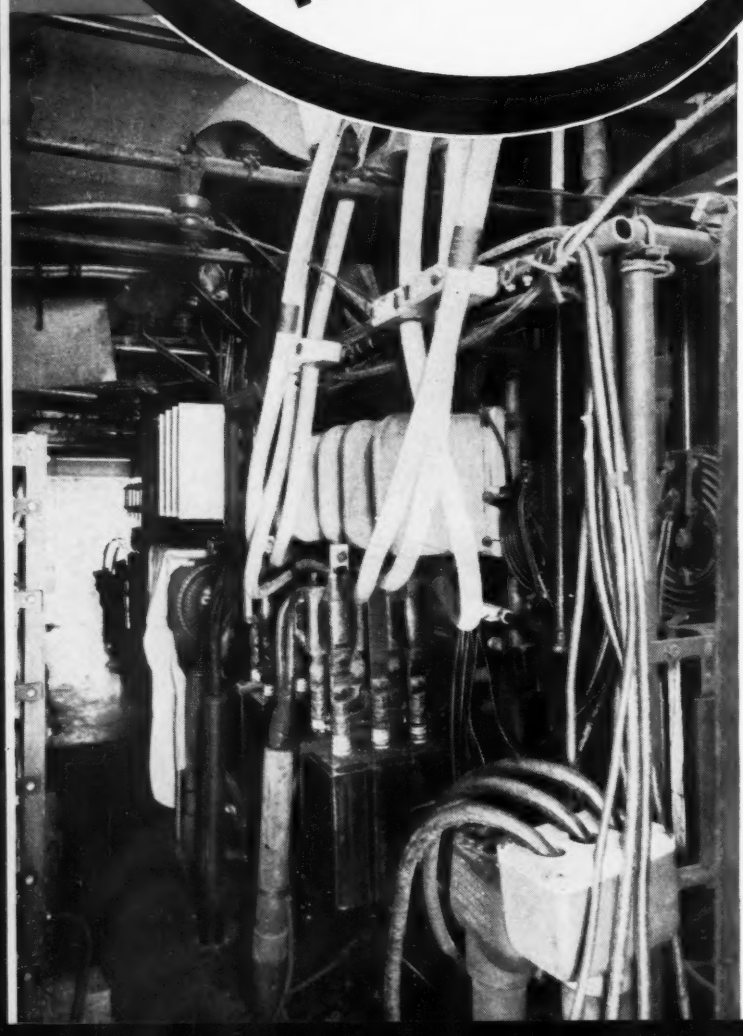
SQUARE D COMPANY

LOS ANGELES • DETROIT • MILWAUKEE

Watch Out

FOR "LIVE-WIRE ENTANGLEMENTS" IN YOUR PLANT





PROTECT PERSONNEL AND PRODUCTION WITH . . .

Safety-enclosed Switchgear

DANGEROUS "spiderweb switchgear" like this originates as strung-out, open-type switchgear, and grows more dense and more dangerous every year that additional devices are added. It often adds up to power interruptions and accidents to personnel.

That's why compact, safety-enclosed switchgear is going not only into today's new and enlarged plants but also into scores of existent plants to replace exposed, open-type assemblies. Industry knows that its job is far too big—and its man power too precious—to trust in haphazardly exposed devices.

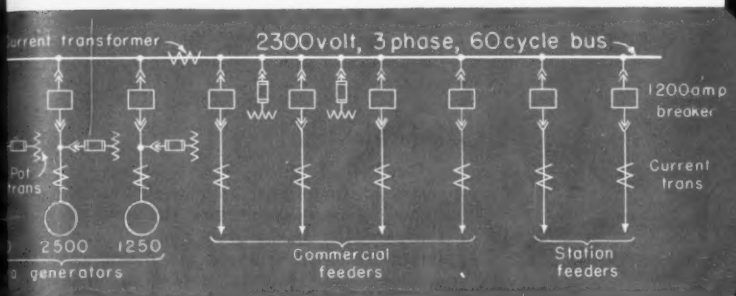
Today you can select, order, and install safety-enclosed switchgear in less time than ever before, because General Electric has ***standards*** to fill your needs. Standard load center unit substations, too, consisting of ***metal-enclosed*** switchgear and ***Pyranol*** transformers. Scores of war plants have kept in step with swelling power needs by installing these safe, compact, factory-assembled units instead of dangerous open-type assemblies. They give you long-term safety and dependability—save tons of vital copper.

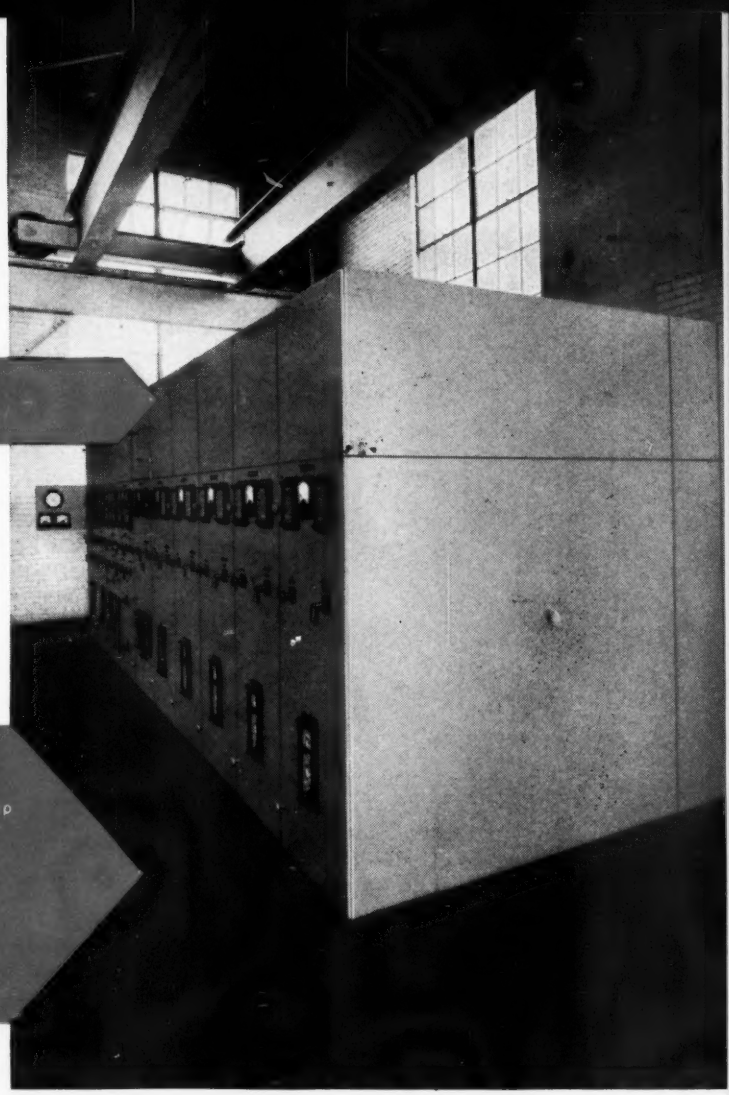
THIS DANGEROUS AISLE LINED WITH LIVE COPPER WAS WIPED OUT . . . .

. . . WHEN THIS MODERN SAFETY-ENCLOSED SWITCHGEAR WENT IN

. . . because metal-clad includes breakers and all associated equipment—instrument transformers, buses, and connections—in one safe, compact "package."

This simple, one-line diagram enabled us to put our switchgear factory right to work on the safety-enclosed units shown at the right.





SAFETY-ENCLOSED UNITS LIKE THESE CAN BE INSTALLED . . . *QUICKLY*

With the one-line diagram of the electric system, General Electric engineers helped select *standard* switchgear that filled every requirement. It took a relatively short time to manufacture the standard units. They were shipped complete—on arrival, they had only to be set in place and connected.

The modern metal-clad switchgear with vertical-lift breakers took over the load, the old open-type apparatus was removed, and power was continued without interruption.

Safety-enclosed unit substation, including Pyranol transformer and drawout air breaker equipments, installed indoors at a load center.

. . . AND WITH TONS LESS COPPER

These metal-clad switchgear units took only 47 pounds of copper each—less than one-fourth as much as open-type assemblies for the same job. This is because compact, metal-clad construction does away with the many long, strung-out copper interconnections of open-type switchgear—replaces them with a few short ones. Also because copper disconnecting switches like those on the opposite page are entirely eliminated by modern, vertical-lift breakers that can be quickly and easily connected and disconnected from the main buses.

Unit Subs Save Still More Copper

What's more, you can save immense amounts of cable copper by installing safety-enclosed unit substations—including *metal-enclosed* switchgear and *Pyranol* transformers—right at the center of the load area. Power can then be distributed to load centers at relatively high voltage. This means *short* secondary cables—and tons of copper saved.

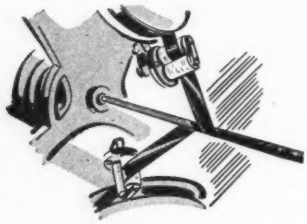
Ask the nearest G-E office about *standard* G-E switchgear and unit substations. You can save time and copper, and get a new high degree of operating dependability and safety. *General Electric, Schenectady, N. Y.*

GENERAL ELECTRIC

Empire VARNISHED CLOTH AND TAPE helps lick 3 wartime insulating problems!

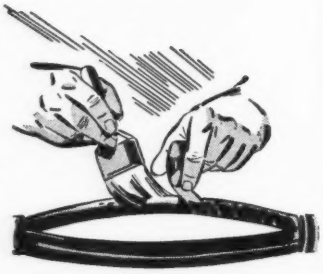
Conserves rubber in cable insulation

If you are putting cables into rooms that are hot . . . if cables must withstand temporary overloads and sudden voltage surges . . . then specify an Empire insulated cable *in place of heat-resisting rubber.* The varnished cloth has the dielectric strength and resistance to both heat and aging needed for these tough services.



Speeds handling of cable joints

In maintaining widespread distribution systems, Empire seamless bias tape assists repairmen in making cable joints as reliable as the cable itself. *Easily handled* and *packed in oil,* the tape goes on smoothly and uniformly . . . to assure highest dielectric strength and freedom from moisture.



Improves performance of repaired motors

Whether it's a motor or generator, transformer or control . . . Empire gets them back on the job faster, gives you the same kind of coil and slot performance as the original equipment. In a variety of forms, this material combines *flexibility* that means easier handling with the *electrical characteristics* that keep down servicing and repairs.

IF THERE EVER was an insulating material of the moment — this it it! Empire Varnished Tape is saving valuable rubber in heat-resisting cable installations . . . saving time in making cable joints and motor repairs . . . and giving improved electrical performance in the bargain.

No matter how exacting your specifications, you will find these cotton and fiberglas yarns, impregnated with specially-developed Empire varnishes, give you the "tops" in performance from every standpoint: — higher temperature and moisture resistance; greater tensile breaking strength; minimum space factor; extra pliability and resistance to aging. And these properties are being proved every day in actual service as well as in laboratory tests by both equipment manufacturers and utilities.

To get varnished insulation at its best, send a brief description of your requirements to *Insulation Headquarters.* We will recommend the cloth and varnish best suited to your needs — and quote prices and delivery schedules promptly.

ANGUS-CAMPBELL, INC., *(Factory Representative to Mica Insulator Co.),* 2122-4th Ave., SEATTLE. 449 S. San Pedro St., LOS ANGELES. 235 San Bruno Ave., SAN FRANCISCO.

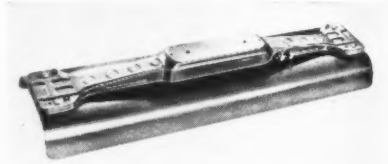
MICA INSULATOR COMPANY

MICANITE . . . EMPIRE VARNISHED INSULATIONS . . . LAMICOID LAMINATED PLASTIC MATERIALS

F-Fixture (703)

Sylvania Electric Products is manufacturing a new industrial type fluorescent fixture, which it states conforms to latest WPB critical material weight limitations and at the same time includes new and improved features. Initial unit is designed to operate two or three 40-watt lamps. A companion unit to be introduced soon will be for two 100-watt lamps.

Features designed to facilitate installation



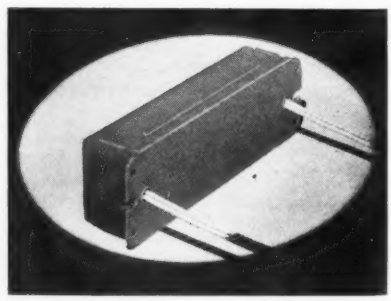
include chain hanging ears on 43-in. centers, half-inch knockouts on 18, 24 and 36-in. centers, channel for adjustable slide-grip hangers and knockout for levolier pull chain switch. The reflector is anchored to the top-housing by a device which is released with a quarter-turn. Joining straps are available for joining a group of units into continuous rows.

Industrial Unit (704)

Day-Brite Lighting, Inc. is offering a new series of fluorescent industrial fixtures designed in compliance with the steel limitation order. The wiring channel and end boxes which incorporate the socket saddles are of steel securely welded together to assure lamp spacing and sturdy construction, the manufacturer states. Non-metallic reflectors and channel covers are finished in baked enamel. These reflectors are held in place by two wing type latches, which are attached permanently to the reflector. Ballasts are single units for two 40-watt and three 40-watt and two 100-watt lamps. Couplings are available for making continuous installations.

Ballast Line (705)

A line of ballasts with leads coming out through two bushed holes at each end of the base plate has been announced by General Electric Co. Bottom location of the leads, only difference between the new units and the company's conventional ballasts, will save pounds of critical material per fluorescent fixture, according to the manu-

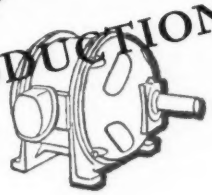


facturer. Since the bottom lead ballasts can be mounted exposed atop a narrow, shallow wiring channel, need to allow room for the complete ballast in the fixture proper is eliminated, it is pointed out. Because of their exposed location, the new ballasts are said to operate in lower ambient temperatures and do not require special installation features. Available in 40-watt Tulamp and three-lamp ratings and 100-watt Tulamp and Forlamp ratings.

This CONSERVATION PLAN

will help YOU

- SAVE MAN-HOURS
- SAVE MATERIALS
- SPEED PRODUCTION



Wartime Conservation means MORE than just conserving copper, steel, aluminum . . . it means the most strategic possible use of all of the ingredients of Victory—materials, man power, time and ingenuity.

These five major points comprise a complete program developed by Westinghouse for Wartime Conservation. This program packages up Westinghouse engineering experience in the entire field of electric and power equipment and related materials. Examples noted are but five of many specific recommendations.

This experience and these recommendations are offered fully and without obligation. If you are not already familiar with them, consult your Westinghouse representative or send for the new 100-page book, "WARTIME CONSERVATION". It will be sent you without cost. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pennsylvania.

J-90483

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Put this 5-point program into action

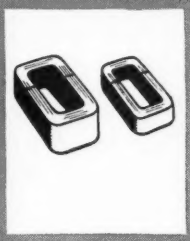
1. Conserve

by strategic selection, application and use of electrical equipment.

EXAMPLE

Where plant power systems are carrying heavy inductive loads, capacitors release important system capacity and permit use of more motors without adding to transformer, switching and line equipment.

2. Conserve



by utilizing new developments that reduce need for critical materials and man-hours.

EXAMPLE

Hipersil*—a new electrical steel—increases the flux-carrying capacity of transformer and similar cores, large and small, up to 35%. Weight and amount of critical materials can be reduced as much as 50%.

3. Conserve

by utilizing available facilities for preventing breakdowns and machine outages.

EXAMPLE

The Westinghouse "FSL" plan for Fewer, Shorter, Longer-lasting repairs is a complete program of preventive maintenance. Westinghouse engineers will help you inaugurate this program in your own plant.

4. Conserve

by utilizing new materials which in many cases can replace critical materials and do a better job.

EXAMPLE

Prestite—a new pressure-molded porcelain which can be solder-sealed to metal—is replacing bushing assemblies requiring rubber or gaskets to keep out moisture, in many types of electrical apparatus.

5. Conserve

by tapping all sources of salvageable scrap.

EXAMPLE

Systematic planning can uncover many ways of reclaiming worn equipment and waste material. Samples of salvage forms and organization charts in use in Westinghouse plants will gladly be made available on request.

*Registered trade-mark, Westinghouse Electric & Mfg. Co., for High PERmeability SILicon steel.

for ELECTRICAL and MAINTENANCE ENGINEERS and PURCHASING AGENTS

The NEW MEYBERG SPECTRUM SERVICE

PUBLISHED MONTHLY BY THE LEO J. MEYBERG CO.
Engineers and Buyers of Electronic and Electrical Supplies

AUG. 1943

MONTHLY BULLETINS

GIVES YOU:

- **TIMELY, VITAL INFORMATION ON ELECTRONIC AND ELECTRICAL**

  PARTS
  MATERIALS
  EQUIPMENT
  LITERATURE

- **READY REFERENCE**

  Each issue is indexed on the front cover to save your time, and complete index pages will be furnished you every four months.

- **DATA**

  On new industrial applications of Electronic control devices; of the Near Infra Red Process; and of Engineered Sound, and Lighting.

Yours is a man-sized job, keeping up-to-the-minute on changes and new developments in the industrial electronic and electrical supplies fields.

The Meyberg SPECTRUM Service monthly bulletins are designed to give factual, easy-to-read information on new parts, equipment, materials, and literature in "capsule" form for quick digestion by busy men like you.

Almost like a direct wire flashing the news to your own desk, these new service bulletins will keep you "on top" of changes and rulings affecting you—and chart your shortest short-cut to the equipment and supplies you want. *Watch for the first issue to arrive at your desk soon.*

Investigate MEYBERG *First!*

Since 1908, the name Leo J. Meyberg Company has been associated with an outstandingly complete and aggressive distributorship service. Today, we are stocked and equipped to serve industrial engineers, maintenance men, and purchasing agents with the most complete inventory of industrial electronic and electrical supplies available through any one organization west of Chicago. Make Meyberg's your ONE-STOP supplies source.

For information or parts and equipment in Industrial Electronic and Electrical Supplies covering the Full Frequency Range of the Electromagnetic Spectrum call or write the—

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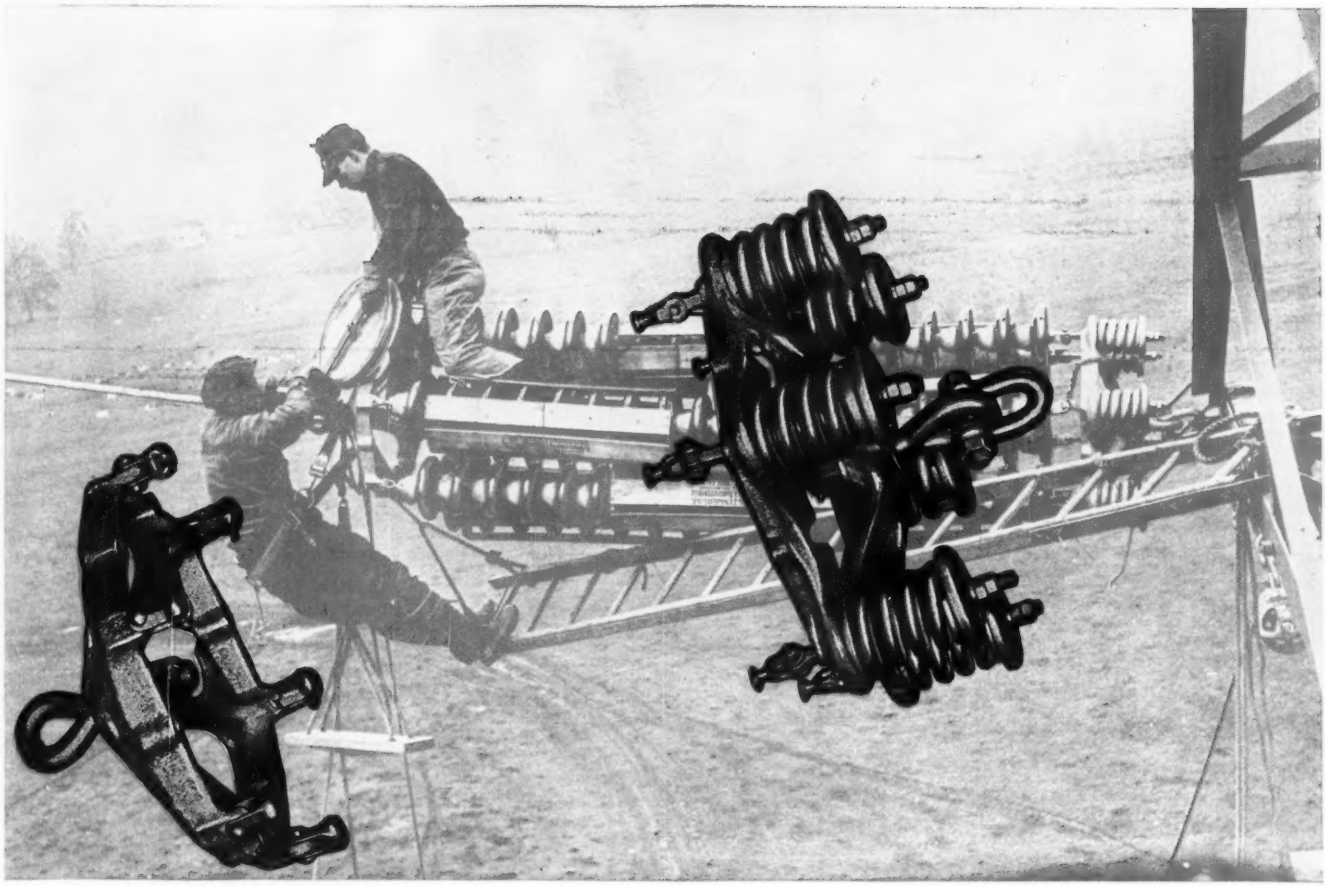
Slim and Red DON'T WORRY



Nearly six hundred feet in the air and handling six, eighteen unit strings is a job for steady nerves and experience.

But they're not worrying, and neither are the engineers who o.k.'d the B.T.C. yoke set that equalized all six strings.

Supplying transmission line hardware calls for more than production facilities; it calls for a combined knowledge of your problem and metal working.

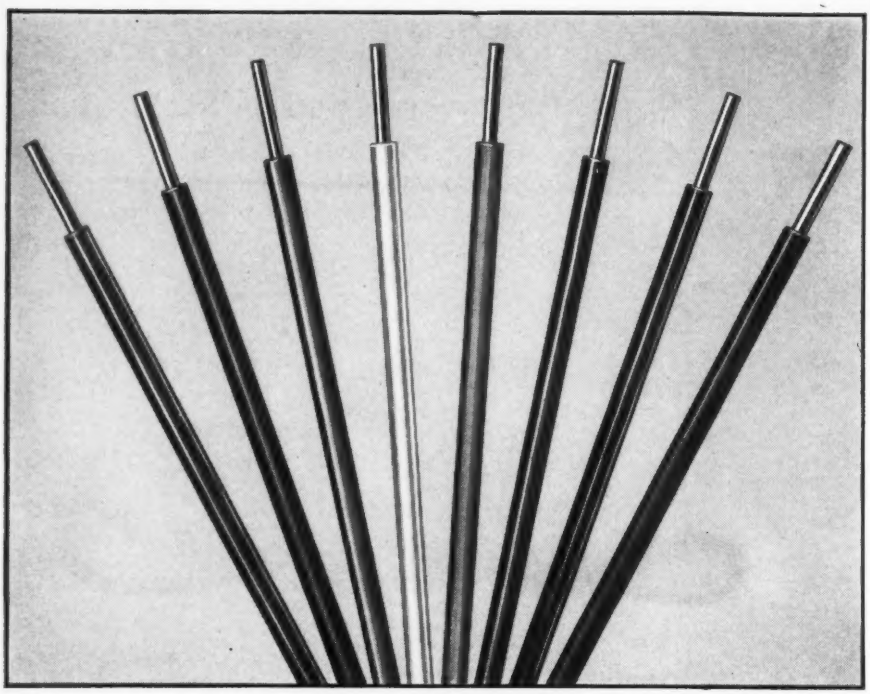
We invite any problem in transmission line hardware.

Through Your Insulator Manufacturer Only

Transmission Line Hardware

B-T-C

THE BREWER-TITCHENER CORPORATION
CORTLAND, NEW YORK



FLAMENOL* BUILDING WIRE

TYPE SN

FOR MAINTENANCE WIRING
FOR NEW WAR WIRING AND REWIRING

You can now obtain this dependable, small diameter, synthetic insulated Flamenol Building Wire for your war-purpose jobs — maintenance wiring, new wiring or rewiring. The available supply of resins has improved. They are being allotted for electrical conductor insulation where copper is allocated.

Flamenol's small diameter enables more wires to be used in conduits. Its smooth finish makes wire pulling easy. Its insulation is superaging, high in dielectric and mechanical strength, flame retarding and resistant to oils, moisture, acids, etc. Use it for branch circuits, feeders and special wiring. It is available in sizes 14 to 4/0.

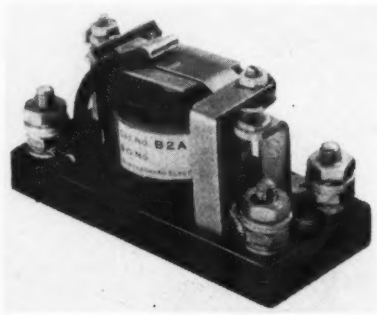
For further information see nearest G-E Merchandise Distributor or write to Section W733-18, Appliance and Merchandise Department, General Electric Company, Bridgeport, Conn.

*Reg. U. S. Pat. Off.

GENERAL ELECTRIC

Aircraft Relay (706)

Ward Leonard Electric Co. has developed a relay for aircraft power circuits, which it claims will perform at high values of acceleration of gravity and under conditions of vibration and shock. The armature and contact assembly are designed to



retain position under such conditions. The normally open, single-pole contacts are rated 25 amp. at 24 volts d-c non-inductive load with good characteristics on inductive loads, it is stated. The contact gap and tail spring tension are adjustable.

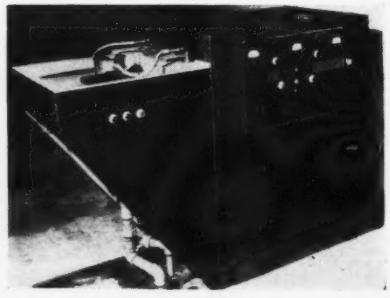
Industrial Thermometer (707)

Taylor Instrument Companies have designed a one-piece industrial thermometer which they state will save critical bronze. The one-piece case is shallower, making it possible to see the mercury column through a wider angle of vision, the announcement points out, and the chromium-plated bezel fits into the grooved case in such a way as to hold the thick glass front securely against four wavy tension springs. These springs are fastened securely under the scale by shakeproof screws.

According to the manufacturers, construction of the thermometer results in a dustproof, rattleproof and practically fumeproof unit. It is announced that the instruments will be equipped with Binoc tubing and will be furnished in combinations of straight and angle stems, with threaded or union connections and in many standard temperature ranges within the limits of −40°F to +750°F. Standard scale lengths are 7 and 9 in.

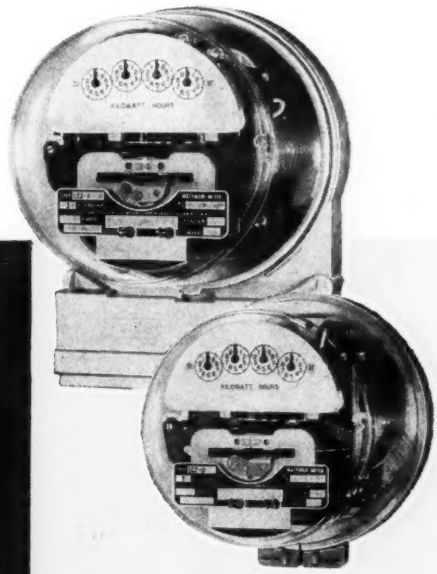
Electronic Heaters (708)

General Electric Co. has developed a line of electronic heaters for high-frequency induction heating of metal parts for brazing, soldering and selective heat treating. According to the manufacturer, these heaters are essentially power oscillators, which convert 60-cycle power to high-frequency power at approximately 500,000 cycles. Available in two standard sizes, having an output of 5 and 15 kw. Electronic tubes, when properly applied, are said to have an average life expectancy of from 5,000 to 10,000 hours and more.



WAR BONDS MAKE UNCLE SAM MORE POWER-*full*

ARMY E NAVY



"On Measurement is founded the whole progress of man.."

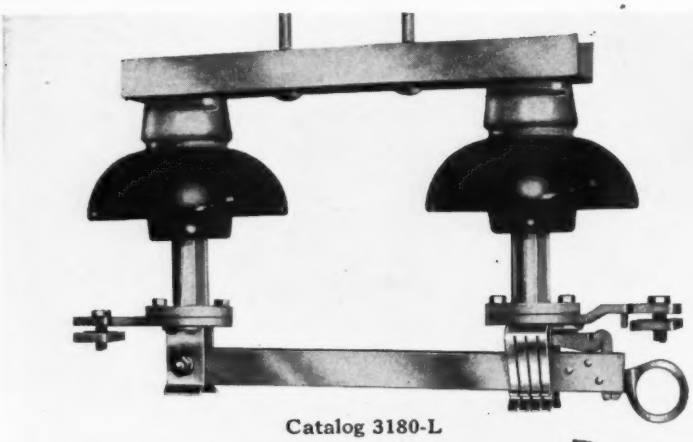
A farmer would be in an unending bedlam of argument with all his neighbors should he re-measure the boundaries of his land by the original way of determining the acre. Here is the way it was done about the time of the fall of the Roman Empire in 476 A.D.: Wielding heavily his willowy sprig, the farmer would push his ox until perforce the ox stopped to catch his breath. Twice up and back they would go, a rood between each furrow, and that was an acre—and that, too, was the conception of standardization. Compare it with today's high standard of measurement of electricity set and met by the electric utilities and the manufacturers of watthour meters.

NO OTHER COMMODITY IS MEASURED SO *Accurately* AS ELECTRIC POWER

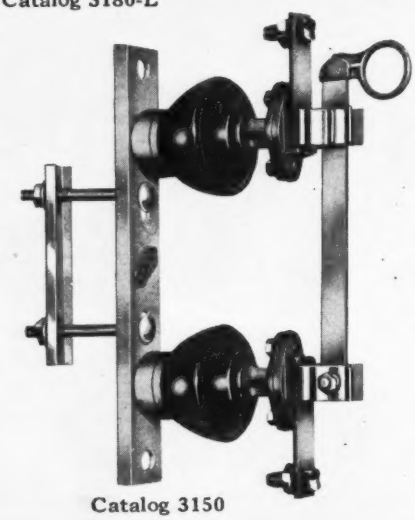
SANGAMO ELECTRIC COMPANY SPRINGFIELD ILLINOIS

OPEN TYPE
MATTHEWS DISCONNECTING SWITCHES

Adaptable for Horizontal or Vertical Mounting



Catalog 3180-L

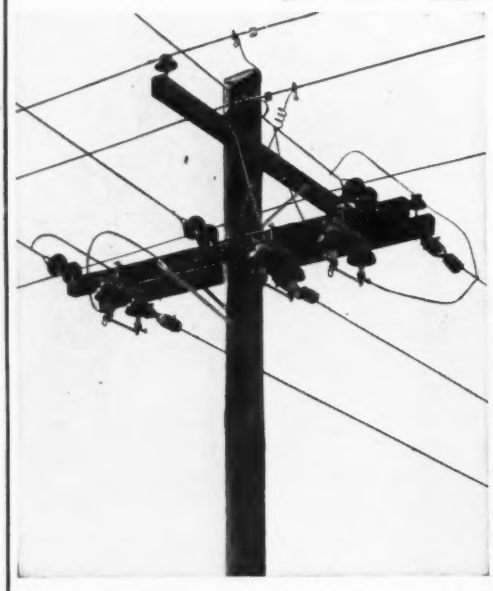


Catalog 3150

High Quality Materials Mean Lowest Time-Cost

•

No Radio Interference at Rated Voltage



Shows installation of Catalog 3158 Matthews Disconnecting Switches.

Matthews Disconnecting Switches are made in 200 and 400 Ampere sizes and 7.5, 15 and 23 Kv. Ratings.

Write for Bulletin 106
It gives complete information.

Where cost of equipment is limited due to low revenue lines, these low-cost, substantially constructed, hot stick operated Matthews Disconnecting Switches will meet your needs for economical and efficient operation.

Special insulators of our own design, have ample electrical values for their respective ratings in accordance with NEMA Distribution CUTOUT Standards, Publication 38-53. Galvanized certified malleable iron caps and pins are securely cemented onto insulators in accordance with our 96-hour natural cement curing process which has given perfect satisfaction in the field for over twenty years.

All current carrying parts are of at least 85% copper content material; all other metal parts are hot galvanized.

The 200-ampere Disconnecting Switches are equipped with single, heavy bus bar copper blades, while the switches rated 400 amperes have double blades. All can be furnished with blade latches, as illustrated, at additional cost.

Female contact clips of bus bar copper, reinforced by spring phosphor bronze retainer clips, assure positive contact with no overheating, at full rated load.

W. N. MATTHEWS CORPORATION
SAINT LOUIS, U. S. A.
ENGINEERS and MANUFACTURERS SINCE 1899

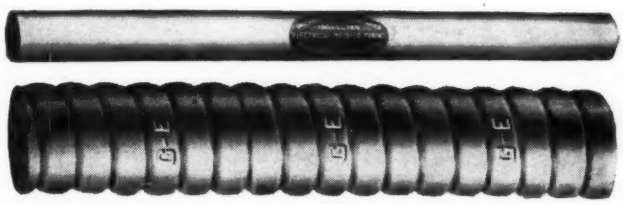
G-E CONDUIT FOR HAZARDOUS AND WET LOCATIONS

Both G-E White zinc-coated conduit and G-E Black enamelled conduit are available at G-E distributors for protecting war-purpose wiring in wet or hazardous locations. Use these high quality conduits for maintenance jobs . . . for rewiring . . . for new war wiring.

WPB Limitation Order L-225 permits the following uses for rigid conduit: (Type of protective coating is not restricted.)

1. In war implements such as warships, aircraft armament, tanks, etc.
2. In projects rated A-1-J or better for hazardous or wet locations (with conduit size limitations).

G-E White is hot-dipped galvanized inside and out. G-E Black is coated inside and out with a corrosion-resistant enamel. Both are leaders in their classes.



G-E FLEXIBLE CONDUIT AND EMT FOR WAR WIRING JOBS

You'll like the high quality of G-E Electrical Metallic Tubing and G-E Flexible Metal Conduit. They are easy to use and will give good service. These materials can be used to protect war-purpose wiring in certain locations according to WPB Limitation Order L-225.

FOR FURTHER INFORMATION *about G-E conduits, wires and cables and wiring devices see the nearest G-E Merchandise Distributor or write to Section CDW-731-18, Appliance and Merchandise Dept., General Electric Company, Bridgeport, Conn.*

GENERAL ELECTRIC

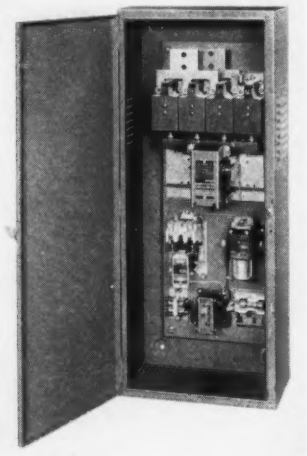
G-E WAR-PURPOSE WIRE AND CABLE AND WIRING DEVICES

The G-E line is large. You'll find the wires and cables and wiring devices in it that you need for maintenance jobs and for new war wiring of all kinds.

VICTOR INSULATORS INC
VICTOR, NEW YORK
Distributed by MAYDWELL & HARTZELL, Incorporated
SAN FRANCISCO LOS ANGELES SEATTLE

Safety Control (709)

Square D Co. has developed a safety control which it claims eliminates the hazard created by high open circuit voltages of transformer type a-c arc welders. The new panels are designed to automatically disconnect the welder transformer after the arc is broken. The transformer is reconnected the instant the operator touches the electrode to the work. It is pointed out by



the manufacturers that, when the safety panels are used, the welding transformer is connected to the power line only while the arc is held. The controls can be used with any make or model of a-c transformer type arc welder; external connections are simple and internal connections of the welder need not be disturbed, according to the manufacturer.

Foot Switch (710)

As a new use for its heavy-duty foot switch, the Nathan R. Smith Mfg. Co., suggests that the device can be utilized as a knee switch to free the operator's hands. According to the manufacturer, the switch is being used on intermittent operations such as small drill presses, grinders, bench machines, and solenoid operations and is suitable for controlling magnetic starters on larger machines.

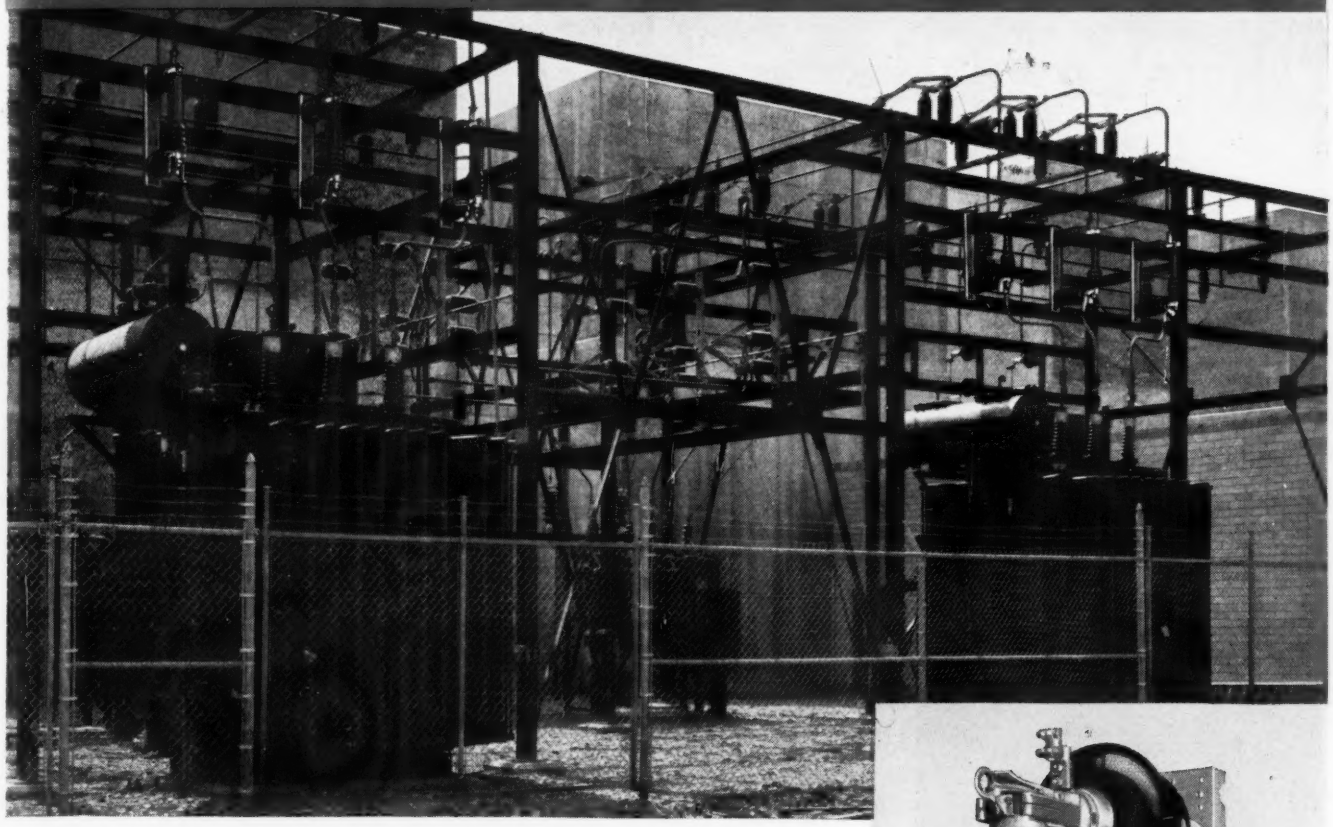
Lighting Fixtures (711)

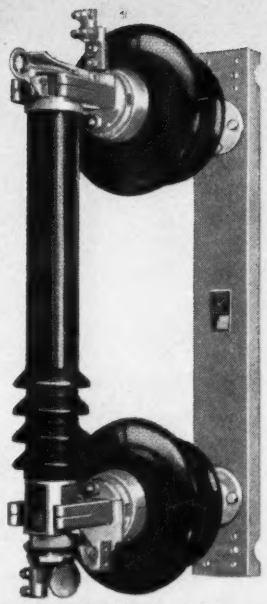
Martin-Gibson Co. states that its new "5000 line" of industrial fluorescent lighting fixtures has been designed with a "Flexi-Coupler," a device permitting spacing of fixture units as much as six inches apart, while preserving all features of a continuous-run installation. According to the manufacturer, this makes possible the use of nine instead of ten 100-watt fixtures in a 50-ft. run. Non-metallic reflectors are said to attain a reflection factor of from 89 to 91%. Available in two 40-watt, three 40-watt and two 100-watt sizes.

Welding Positioner (712)

Ransome Machinery Co. has announced a welding positioner to handle loads up to 500 lbs. with the center of gravity of load 6 in. away from the table top and with a 6-in. eccentricity. Available in hand or motor-operated models. The motorized unit includes a Reeves variable-speed drive, providing a speed range of up to 1 rpm. of the table top. Tilting range is a full 135° from horizontal or 45° beyond vertical providing the "down under" position for all downhand welds. The 26-in. diameter circular table top is T-slotted to simplifiy clamping work to it.

PROTECTING VITAL PRODUCTION





POWER supply and electrical equipment for the great plants producing vital armament and other war materiel require dependable protection to insure against production delays.

Such protection is being provided by S & C Type "SM" Power Fuses for many important installations. The one shown above on the property of a large aviation engine plant illustrates the small space required. Electrical engineers have selected these fuses because of their dependability, uniform accuracy in time-current characteristics and their high interrupting capacity. Their use also saves labor and installation time,—and they require the use of very little critical metals compared to other types of interrupting equipment of equivalent capacity.

High Interrupting Capacity

Within their ratings—S & C Type "SM" high interrupting capacity Fuses provide the ideal protection. They are made for indoor or outdoor service for 2300/4000, 6600, 13,200, 22,000, and 33,000 volt circuits in ampere capacities from 1 to 400, with short circuit interrupting ratings up to one millon KVA.

Recommendations by S & C engineers will help you select appropriate protective equipment.

SHORT CIRCUIT-INTERRUPTING RATINGS IN R.M.S. AMPERES

Fuse Voltage Rating→	7,500	7,500	15,000	23,000	34,500
Circuit Voltage→	2,300/4000	6,600	13,200	22,000	33,000
**SMPC-4	17,500	15,000	12,500	10,000	7,500
SMP-4	27,500	25,000	20,000	15,000	10,000
*SMPC-5	30,000	25,000	20,000	17,500	15,000
SMP-5	40,000	35,000	30,000	25,000	20,000

**Equipped with Condenser.

SCHWEITZER & CONRAD, INC.

4435 Ravenswood Avenue, Chicago, Illinois

Manufactured in Canada by Powerlite Devices, Ltd., Toronto, Ontario.

TYPE "SM" POWER FUSES

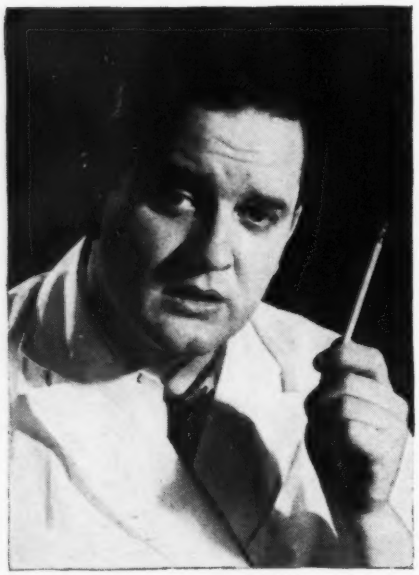
WESTERN REPRESENTATIVES:

SAN FRANCISCO
George E. Honn, 420 Market Street
LOS ANGELES
Farnham & Cunningham, Edison Bldg.

SEATTLE
T. S. Wood, 220 Ninth Avenue, North
SALT LAKE CITY
Riter Engineering Co., Kearns Bldg.

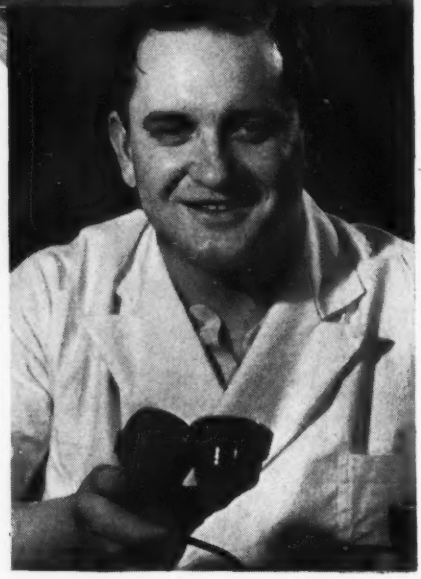
Here's a transformer oil that's got real STAMINA!

1 Today, with transformers handling larger loads than ever before, the quality that counts most in a transformer oil is *stamina*. Unless the transformer oil you use is tough and stable, it just won't stand the gaff. It will allow your equipment to over-heat and cut down efficiency.



2 That's why you should know more about Red Line Transformer Oil. Union Oil Company chemists have built into this oil real stability and stamina. Exhaustive tests under every service condition show high resistance to sludge and other deposits that retard transfer of heat and cut down efficiency.

3 That isn't all, either. Red Line Transformer Oil is absolutely free from moisture, lint, dust and other foreign particles that reduce insulation. Its *high flash point* minimizes evaporation losses at high temperatures. And when the mercury falls well below zero, Red Line stays *free-flowing*—a very important quality for transformers in cold climates.



4 So before you forget it, give your Union Oil Resident Manager a ring and have him deliver a supply of Red Line Transformer Oil. You'll find it pays to buy a transformer oil that has the "stuff" to do a wartime job.

RED LINE *TRANSFORMER OIL*

UNION OIL COMPANY

TAKE THIS TIP! When you buy petroleum products, buy enough to last. It will protect you against transportation tie-ups and it will insure you an adequate supply of the products you need.

OIL IS AMMUNITION—USE IT WISELY

MAINTENANCE

doesn't mean *neglect* ...even with Bus Duct

So simple, so sturdy, so soundly engineered is Bus Duct that only a minimum of maintenance is needed. Yet that *minimum* is important.

A thorough inspection and routine service once a year are usually enough to keep Bus Duct at top efficiency. But more frequent attention pays, especially where the system may be subjected to moisture, salt-laden air or corrosive fumes.

Here are some points to watch:

Keep hanger bolts and bus bar connections tight.

See that nothing is left in the duct that does not belong there.

Clean out metallic dust and dirt periodically with an air hose.

Watch for insulation abrasions on cables.

Check plugs for loose fuse clips, defective contacts and faulty cable connections.

Maintenance is a real, if unspectacular contribution to the war effort.

Bus Duct can really "take it." Given ordinary, commonsense care, it will keep on delivering power and light under the heaviest loads, at lowest possible maintenance cost.

BUY MORE WAR BONDS • SALVAGE ALL SCRAP METAL

Send for descriptive Bulletin No. 427

BULLDOG
ELECTRIC PRODUCTS CO.
DETROIT, MICHIGAN
BullDog Electric Products of Canada, Ltd.
Toronto, Ontario
Branch Offices In Principal Cities

MANUFACTURERS OF Vacu-Break Safety Switches, SafTo-Fuse Panelboards, Circuit Master Breakers, Switchboards, Bus Duct Systems — FOR LIGHT AND POWER.

BULLDOG PRODUCTS ARE SOLD AND DISTRIBUTED BY THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

Coast Electric & Manufacturing Co.
1720 N.E. Sixth Avenue
Portland, Oregon, Tel. Garfield 2844

Safety Switchboard & Manufacturing Co.
1445 Stevenson St.
San Francisco, Calif., Tel. Hemlock 2470

Mullenbach Electrical Manufacturing Co.
2300 East 27th Street
Los Angeles, Calif., Tel. Jefferson 2224

Out

FOR THE DURATION ON WEDNESDAY

BACK IN "PITCHING" ON SATURDAY

PRODUCTION OF 3" SHELLS THREATENED 9:00 A.M. WEDNESDAY.

BROKEN DOWN 50 KW. MOTOR GENERATOR SET DELIVERED TO

WESTINGHOUSE DISTRICT MANUFACTURING AND REPAIR PLANT.

CLEANED, TREATED STATOR WINDINGS. REPAIRED ROTOR RESISTOR.

CORRECTED GROUNDED COIL. INSULATED AND TREATED FIELD COILS.

ASSEMBLED, TESTED AND DELIVERED SATURDAY, 11:00 A. M.

Westinghouse

DISTRICT MANUFACTURING AND REPAIR

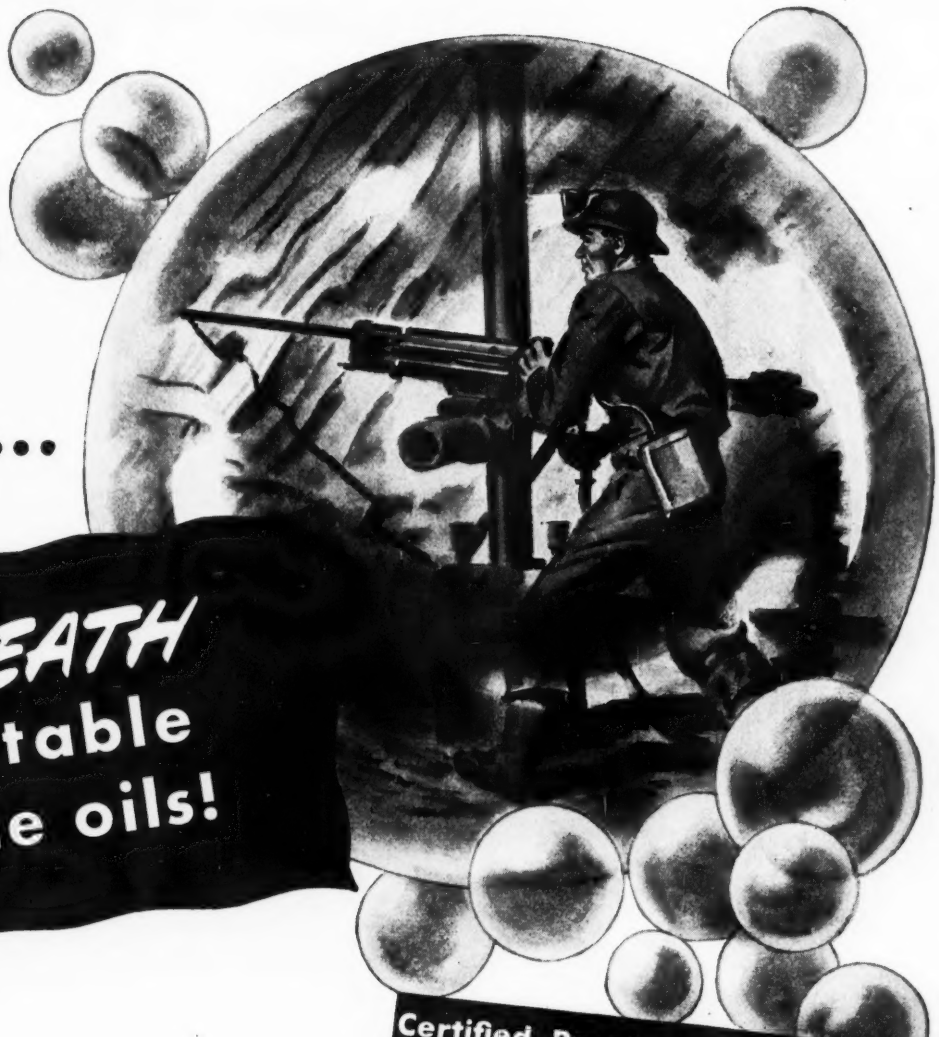
J-90464

IF THE EQUIPMENT NEEDING REPAIR IS VITAL TO THE WAR EFFORT . . . PHONE THE NEAREST OFFICE OF WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY FOR

EMERGENCY SERVICE

33 M & R PLANTS . . . ONE NEAR YOU!

AIR is LIFE to a miner...



but DEATH to unstable turbine oils!

IT'S the tiny bubbles of air in a hard-working turbine that cause oxidation. Ever present, they kill off an unstable oil in a hurry. But even the most adverse operating conditions make little difference to Shell Turbo Oil. Check the analyses at lower right . . . there's practically no difference in the characteristics of Shell Turbo Oil, even after 19,106 hours of wartime operation.

Here you have proof, under actual operating conditions, of the superior oxidation stability of Shell Turbo Oil.

Don't chance the possibility of oxidation or rust knocking out your turbines. Get the complete details on this and other outstanding performances of Shell Turbo Oil from the Shell man. Or, write Shell Oil Company, Inc., Dept. "D," 50 W. 50th St., New York, N. Y., or 100 Bush St., San Francisco, Cal.

Certified Proof of the Superior OXIDATION STABILITY of Shell Turbo Oil

SHELL TURBO OIL WHEN NEW	CHARACTERISTICS	SHELL TURBO OIL AFTER 19,106 HRS. OPERATION
156	*Viscosity @ 100° F.*	160
Clear	*Appearance*	Clear
LT .05	*Neutralization No.*	.05
LT .2	*Saponification No.*	.1
90	*Steam Emulsion*	90

Performance record of Shell Turbo Oil in a unit of the OWENS-ILLINOIS GLASS COMPANY, Streator, Ill.

SHELL TURBO OIL

SHELL

Currently, the U. S. Navy has first call on Shell's entire production of marine turbine oil.

Use This Check List

WHEN INSTALLING BRUSHES ON YOUR ELECTRICAL EQUIPMENT

1. See that all terminals are securely fastened to the brush holder support.
2. Remove dirt and grit from brush holders.
3. Provide 1/8" to 3/16" clearance between commutator and nearest portion of brush support in reaction and box type brush holders. Less clearance is sometimes preferable on small motors.
4. Keep angular position of all brush holders uniform with respect to the commutator.
5. Check neutral point and space the brush arms equidistant about the commutator.
6. See that toes of all brushes on each arm are parallel with commutator segment.
7. To prevent streaking of commutator, stagger brushes in positive and negative pairs.
8. Seat new brushes on commutators and rings accurately with sandpaper or a brush seating stone.
9. Adjust brush spring pressure to conform with manufacturer's recommendation.

Care exercised in the installation, fitting and adjustment of brushes increases life, improves performance and eliminates many of the possible causes of interrupted service.

NATIONAL TRADE-MARK *Carbon, Graphite and Metal-Graphite* BRUSHES

"National" brushes are doing their full share of carrying the enormous load demanded by the Nation's war effort. Essential requirements must be met first. Every effort is being made to satisfy all demands for our brushes in the shortest possible time.

Proper maintenance is paramount in keeping your electrical equipment operating at full efficiency. Many valuable and time saving suggestions as well as details of operations mentioned in the above check list are included in this series of "Modern Pyramids" bulletins. Copies are available promptly upon request.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

UCC

CARBON SALES DIVISION, CLEVELAND, OHIO

General Offices: 30 East 42nd St., New York, N. Y.

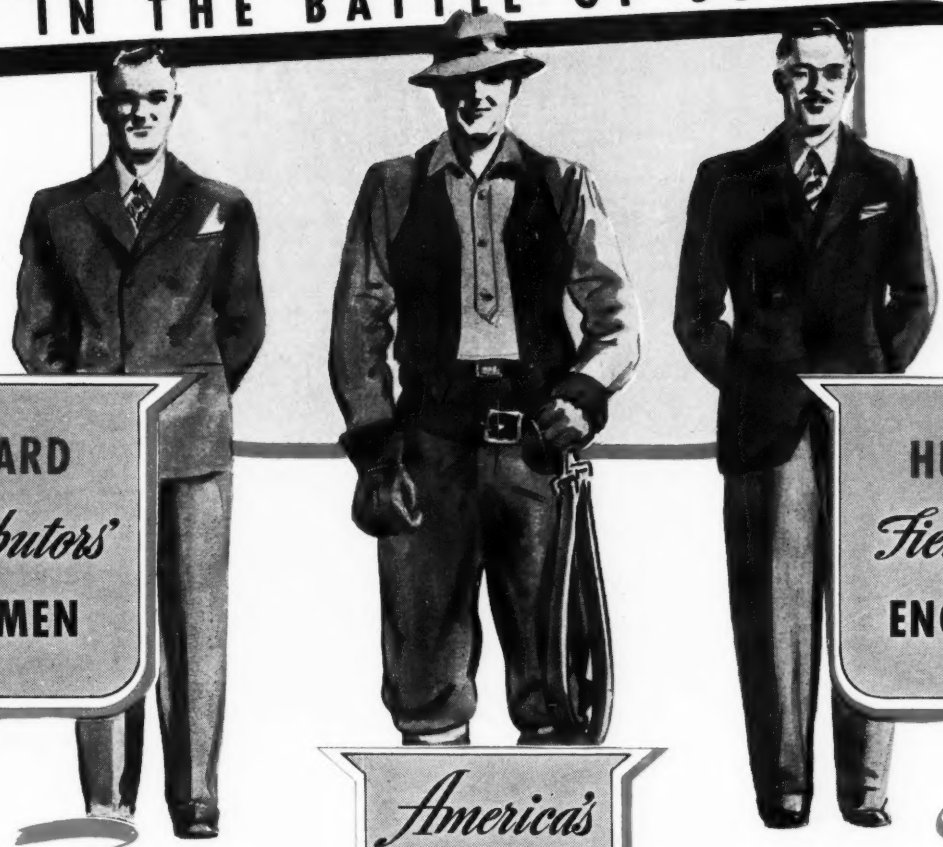
Branch Sales Offices: New York, Pittsburgh, Chicago, St. Louis, San Francisco

LET'S GO! U.S.A. KEEP 'EM FLYING!

THE WORD "NATIONAL" AND THE SYMBOL ARE REGISTERED TRADE-MARKS OF NATIONAL CARBON COMPANY, INC.

The Unsung Heroes

IN THE BATTLE OF SUPPLY



HUBBARD *Distributors'* **SALESMEN**

HUBBARD *Field Sales* **ENGINEERS**

America's **LINEMEN**

Maintaining unbroken lines of supply is a most decisive factor in determining the outcome of today's great battles of production and war. Interruptions in the supply of raw materials or electrical power to the production front could prove just as costly as the delayed arrival of a convoy to the battle front. Keeping America's supply lines open, therefore, is one job that is deserving of a lot of praise and commendation. That is why we wish to pay high tribute to America's linemen, and to the men of Graybar Electric Company and General Electric Supply Corporation, in the west, distributors of Hubbard Poleline Hardware, whose accomplishments have made them "The Unsung Heroes in the battle of supply."

HUBBARD POLE-LINE HARDWARE

- STANDARD POLE-LINE HARDWARE
- COMMUNICATION SYSTEM HARDWARE
- ELECTRIC RAILWAY HARDWARE
- INSULATOR PINS
- POLE TOP FIXTURES AND STEEL CROSS ARMS
- STRAIN INSULATORS AND CLEVISES
- HIGH TENSION MATERIAL
- SECONDARY RACKS AND ACCESSORIES
- POLE AND CROSS ARM BRACKETS
- STREET LIGHTING EQUIPMENT
- RURAL ELECTRIFICATION MATERIAL

HUBBARD

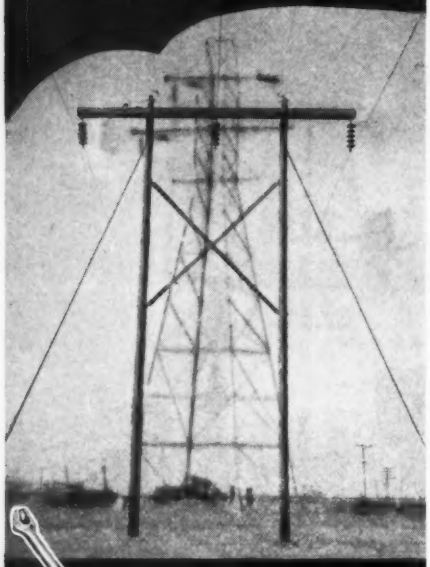
Hubbard and COMPANY

OAKLAND, CAL. PITTSBURGH CHICAGO

HANG THE LOAD ON HUBBARD HARDWARE

HUBBARD

Where "H" frames substitute for towers

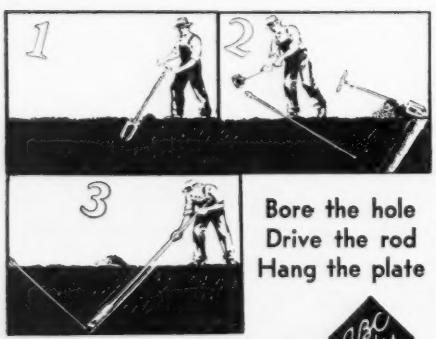


Never Creep Anchors will handle the load . . .

They're BOLTED through solid earth

Pole lines that go up to save steel can be completely adequate for the heavy loads if they are well guyed with Never Creep Anchors. Time tests prove that Never Creeps will retain their holding power longer than any other type of anchor because they pull entirely against solid, undisturbed earth. For dependable holding power plus quick installation specify Never Creep Anchors.

INSTALLED IN THREE EASY STEPS



Bore the hole
Drive the rod
Hang the plate

A·B·CHANCE CO. CENTRALIA MISSOURI

BULLETINS

data books, etc.

Pumps (713)

Ingersoll-Rand Co. has issued a booklet on vertical axial and mixed flow pumps. These units are designed for pumping large volumes of liquid at comparatively low heads, the manufacturer states, and are available in a range of sizes for capacities to 75,000 gpm. and for heads to 100 ft. per stage.

Metal Band Saw (714)

Johnson Mgf. Corp. has issued a four-page bulletin on its metal cut-off-band saw. According to the manufacturer, this unit has a four-speed drive and a ballbearing motor which incorporates thrust bearings for operation in tilted position.

Radio Noise Filter (715)

General Electric has issued an eight-page folder on its new radio noise filter for aircraft applications. Data include performance, attenuation, electrical and mechanical characteristics, application. Illustrated by photographs and diagrams.

Evaporative Condensers (716)

General Electric Co. has a booklet on its new line of evaporative condensers and evaporative coolers. Information with regard to wartime industrial uses of this equipment and a summary of specifications are included.

Blower Wheels (717)

Torrington Mfg. Co. has issued a 64-page catalogue covering its line of blower wheels. In addition to performance ratings and specifications, the booklet contains suggestions for the design of air impelling units.

Metal Cleaner (718)

Colonial Alloys Co. has published a bulletin which describes the uses of the four available types of Cyclodiene base hydrocarbon solvent degreasers and cleaners for metals.

Aircraft Power Package (719)

General Electric has issued a four-page bulletin on its power package for aircraft. This bulletin describes the three types in which the power package is furnished and explains their uses.

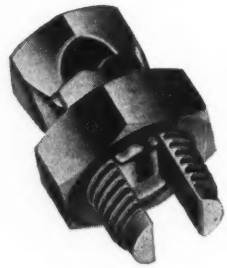
Time Delay Relays (720)

R. W. Cramer Co. is distributing a folder on its Type TDC time delay relays, giving application and construction data, distinctive features, types and prices.

Refrigerated Welding (721)

A four-page folder covering the "Frostrode" process of refrigerated welding has been released by Frostrode Products. Design and operating features are described.

RELIABLE Connectors



Save Time

by using solderless connectors with accurately fitting precision threads which insure easy, permanent installations.

Save Copper

by using these connectors which are good as new after being salvaged.

EASY TO INSTALL
LOW IN COST

Reliable ELECTRIC COMPANY
OVER 30 YEARS SERVICE TO THE UTILITIES
314 CARROLL AVENUE

VICTORY GARDENS AND VICTORY CABLES

Food supply and distribution have become enough of a problem so that everyone who can do so is asked to plant a "Victory Garden" and do a little toward increasing our available supply of food. At the same time, we are warned against wasteful use of seed and fertilizer due to lack of knowledge or skill. In other words, if we are not likely to get reasonable returns from the seed, fertilizer and labor, it is better to leave gardening to those who may get better results.

Similar conditions exist in the wire and cable industry. Cable engineering and manufacturing is a task for those with manufacturing skill and technical background. There is need for more and better insulated wires and cables for electrical transmission but the materials from which to make them are limited in quantity and can best be used by those who have the "know how" based on long experience.

Here at Simplex we have devoted nearly sixty years exclusively to the study and manufacture of insulated wires and cables. We have one objective and only one—to make better cables and do it more efficiently. Through study and experience we have developed skill which enables us to make the most of the limited materials now obtainable. Simplex wires and cables—now available only for high priority war work—meet all conservation regulations yet still retain those qualities that assure satisfactory service. Improvements that cannot be disclosed now will make Simplex wires and cables better than ever after the war.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge, Mass.

Simplex

WIRES and CABLES

PACIFIC COAST OFFICES

390 Fourth St., San Francisco, Calif.

910 East Third St., Los Angeles, Calif.

503 Polson Bldg., Seattle, Wash.

WISH I HAD A

Thermador

AT HOME, TOO!

Heats in Winter Cools in Summer

For many years, Thermador Fan Type Portable Electric Heaters have been providing comfort, convenience, and economy for American homes and plants.

Now they are essential in speeding up war production by improving industrial working conditions. Clean, compact, and safe, Thermador double-purpose units furnish warm air in winter—circulate cool air in summer. Flameless, fumeless. Thermator Heaters are available on priority orders in portable or built-in types for use on 115-volt A. C. service, 1650 watts capacity, or 230-volt A. C. in capacities up to 5000 watts.

Write Today for Catalog EW7

ARMY E NAVY

THERMADOR

Electric APPLIANCES

THERMADOR ELECTRICAL MFG. CO.

5119 So. Riverside Drive Los Angeles

Seven Leagues Ahead

Hipersil Cores (722)

Hipersil cores are described in a 12-page booklet which Westinghouse Electric & Mfg. Co. has directed to designers of radio and other electromagnetic apparatus. This booklet lists special qualities of Hipersil cores and contains charts of recommended applications, performance curves comparing Hipersil and ordinary silicon steels, tables of available sizes, diagrams of the type "C" core assembly.

Safety (723)

"Safety Speeds Production", a 21-page pamphlet published by the U. S. Department of Labor, is addressed to supervisors. The material was gathered from the experience of foremen and was reviewed for accuracy and usefulness by safety engineers in large war plants.

Multi-Contact Timers (724)

A bulletin on its multi-contact timers has been prepared by R. W. Cramer Co. Applications, construction, standard and special features, and motor style selection are included.

Wartime Lighting (725)

A folder entitled, "Wartime Lighting for Top Efficiency Around the Clock", has been prepared by Kurt Versen Co. Types of fixtures are described and pictured. Price list included.

Labels (726)

Ever Ready Label Corp. has prepared a new bulletin of war production labels. The company also is offering a catalogue of label ideas containing 528 ideas as well as time and labor saving suggestions.

Fastening Devices (727)

Paine Co. has prepared a new catalogue of its line of fastening and hanging devices. A visible index is a timesaver in using the catalogue.

Telephone Cable (728)

Western Electric Co. has issued a new edition of "Telephone Cables," a publication designed to familiarize the communications industry with the company's cable products and to present tabular and factual data of interest to communications engineers.

Nitriding Furnaces (729)

A 99-page paper covered book on nitriding furnaces has been published by the Nitralloy Corp. Prepared for those contemplating a nitriding furnace installation, contents include data on furnaces and fuels, ammonia and its handling, determination of furnace size for nitriding, instruments for measuring ammonia flow and other information.

Air-Cooled Transformers (730)

"Power Where You Need It" is the title of a bulletin issued by Acme Electric & Mfg. Co. and describing air-cooled transformer applications. This folder lists the various types of air-cooled transformers manufactured by the company.

Ventilation (731)

In "The Case of the Careless Kitchen", Ilg Electric Ventilating Co. tells how to solve a domestic problem. The 32 page booklet, written from the point of view of a "private investigator" contains several other case histories of "crimes" relating to ventilation.

Standard Steels Data (732)

Babcock & Wilcox Tube Co. has issued a technical data card containing the combined list of standard steels of the American Iron and Steel Institute and the Society of Automotive Engineers, Inc.

Pipe Specifications (733)

A revised list of standard specifications for seamless tubes and pipe, arranged in finger tip form, is available from Babcock & Wilson Tube Co.

Insulation (734)

Sterling Varnish Co. is distributing a bulletin on Thermobonds insulation. This publication describes 10 insulating mediums. The manufacturer reports that the materials are produced for application to such units as high-speed armatures, high-cycle drill and grinder motors, heavy-duty motors and transformers and marine engine magneto coils.

ELECTRICAL WEST, 68 Post St., San Francisco, California

Please send me information about following CIRCLED items:

700	701	702	703	704	705	706	707	708	709
710	711	712	713	714	715	716	717	718	719
720	721	722	723	724	725	726	727	728	729
730	731	732	733	734					

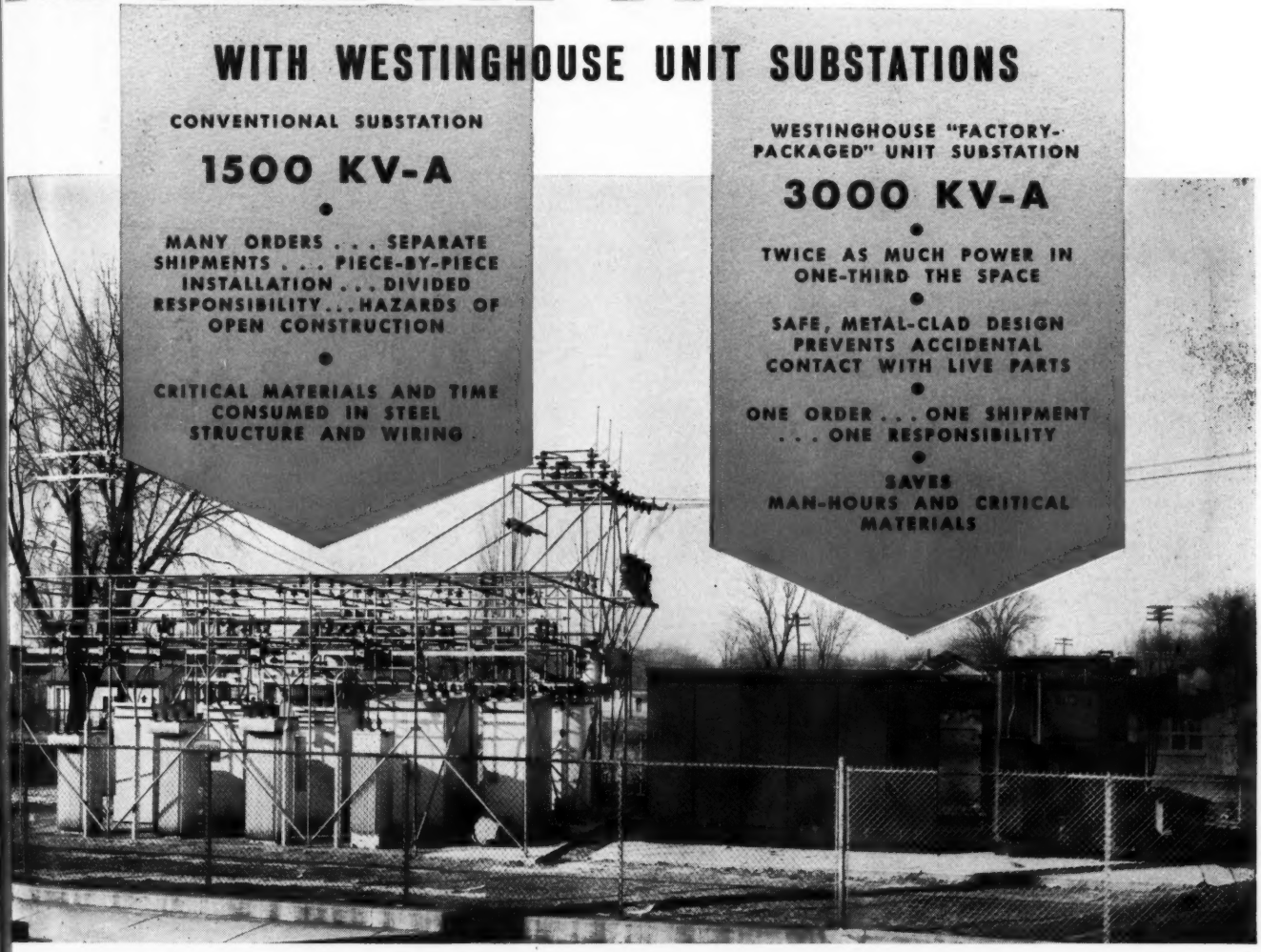
Name..... Company*..... Title*.....

Address.....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

MORE KV-A PER CUBIC FOOT

WITH WESTINGHOUSE UNIT SUBSTATIONS


CONVENTIONAL SUBSTATION
1500 KV-A
MANY ORDERS . . . SEPARATE SHIPMENTS . . . PIECE-BY-PIECE INSTALLATION . . . DIVIDED RESPONSIBILITY . . . HAZARDS OF OPEN CONSTRUCTION
CRITICAL MATERIALS AND TIME CONSUMED IN STEEL STRUCTURE AND WIRING
WESTINGHOUSE "FACTORY-PACKAGED" UNIT SUBSTATION
3000 KV-A
TWICE AS MUCH POWER IN ONE-THIRD THE SPACE
SAFE, METAL-CLAD DESIGN PREVENTS ACCIDENTAL CONTACT WITH LIVE PARTS
ONE ORDER . . . ONE SHIPMENT . . . ONE RESPONSIBILITY
SAVES MAN-HOURS AND CRITICAL MATERIALS

Better than words, this photo shows why Westinghouse "Factory-Packaged" Unit Substations offer a more satisfactory answer when power capacity must be expanded . . . quickly.

In this case, a Midwestern power company had to triple the capacity of the 1500 Kv-a conventional substation, shown at the left, to meet suddenly expanded war demands. Instead of ordinary equipment, a Westinghouse Unit Substation (shown at right) was ordered.

Result: twice as much additional power in one-third the space — installed in less time than would have been required to erect the steel structure alone for a conventional substation.

Westinghouse Unit Substations make these advantages possible because all the many parts of a conventional substation are "packaged" at the factory into one compact unit. And long-time dependable performance is assured by the "Unitized" Switchgear and Transformer Assembly.

★ ★ ★

Get full details on Westinghouse Unit Substations. For complete information, call your Westinghouse Office. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

J-60529

★ ★ ★

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

UNIT SUBSTATIONS

ELECTRA'S HUSBAND

Mars and the Map Makers

ELECTRA bemoans the fact that she paid so little attention to school day geography every time she reads the war news. And she envies the boys who go to war the knowledge they will have when they come home from the battlefronts of this global fight. So I brought her home the script broadcast by Graybar Electric's Charlie Huyck, who is "Sparks" at the San Francisco Electric Club. He called it *Mars and the Map Makers.* Because it sparkles so, she commends it to you. Here it is:

"ON the eve of invasion Lampedusa made the first page for the first time since Aeneas passed that way. (Remember him in high school days? *He* was en route to Rome, too.) We learned that it was a turtle-shaped islet, that it was seven miles long, that a commando had raided it as a stepping stone to Italy. And we know from a month of intensive bombing that Pantellaria is related only by spelling to panatellas or pantelettes. It has not the least resemblance to an expensive cigar with a fancy label or to those rather visible Victorian underthings.

"Four years of global war have given us the names of countries previously familiar only to Conrad fans and stamp collectors, and locations known only to technicians of hush-hush departments. North Borneo, New Caledonia, Port Moresby, Noumea, and Sourabaya are now old friends. They were always there, neatly lettered on their pink or purple backgrounds, but not for us. *Now* they fairly leap at us from the map.

"And the islands of Micronesia! They conceal many a name soon to be significant in the remotest towns of Colorado or the Carolinas. And what of tiny Truk, center of Japanese seapower? How many maps showed it before our Pacific forces began to springboard toward it? And no Aleutian fog was ever thicker than our ignorance about Kiska and Attu before the Japanese foxes went to ground on their bleak hillsides.

"But even our Navy charts have sometimes lagged in the fierce pace. A sub intercepted a flier's report that a Jap destroyer had crawled into a certain palm-fringed harbor to lick its wounds. No such name appeared on the sub's charts, but it did show on a 25c map that had been brought aboard by one of the crew. Result: . . . a torpedo, an explosion—and one destroyer less for the Sun of Heaven.

"The gigantic Russian winter campaign has swung to and fro among frozen landmarks of former wars. But Stalingrad, hitherto unknown except to its steel workers, is now a bugle call like Ypres or Verdun. Each week some new locality such as Novocherkassk or Novorossisk seems to writhe up into view out of the human agony around it. The Russian censor often withholds these jagged place-names—mercifully, for they have caused many casualties among radio commentators, too. A similar mortality has occurred among the China pages of the atlas. . . .

" 'The wildest dreams of Kew are the facts of Khatmandu.' So sang Kipling in a famous line designed to contrast the prosaic with the remote and inaccessible. But after intensive bombing Kew and its splintered greenhouses may be now as strange as a landscape in the moon, whereas the Himalayas are now a familiar landmark to all who fly the aerial Burma Road.

"We need another Kipling, by the way, to give us geography with the tang of a Tommy's vernacular. 'Wipers,' 'Armintears,' 'Plugstreet' quickly adopted themselves into the family in 1915, and Hooge was billed as 'A Hooge Success!' while the guns were still grumbling around the few sticks and stumps that were left of it.

"The African campaign has contributed the Marble Arch and Hell Gate. Jebel means hill, we have heard. Or is it hell? No matter; the doughboys get both impartially, as they added each jebel to their bag. And Mersse Matruh is no longer just a tiny resort where the future Duke of Windsor first met his future Duchess. Who knew then? Who cares now? For Mersse Matruh will live on the maps as the place where Freytag and his New Zealanders burst through the Afrika Korps and halted the British retreat, almost in the suburbs of Alexandria.

" 'The mountains look on Marathon and Marathon looks on the sea!' Many a town has been immortalized by Mars. Before June, 1815, Waterloo was just a bare brown ridge on the Belgian skyline; before June, 1918, Chateau Thierry was just another town along the silver reaches of the Marne. Those tumble-down hamlets in eastern Virginia—Spottsylvania Court House, Cold Harbor, Five Forks—are now as famous as the classical victories of Caesar or Alexander. Magenta and Solferino were merely two villages in Lombardy before Napoleon III defeated the Austrians there. It happened that coal tar dyes and their beautiful analine colors had been discovered in that very year, 1859. When Empress Eugenie as the arbiter of fashion was asked to christen them, she chose the names of her husband's victories—so that the memory of Solferino is perpetuated in rose pink, and Magenta (where 5,000 French dead were scattered among the farmhouses) in deep rose red.

"War is not noticeably tender with reputations. Mars can mar as well as make. Sedan again has become a symbol of shameful surrender. Seventy years after its first notoriety, the Germans rounded the Maginot Line there, thus proving themselves to be unsporting cads for not battering it head-on.

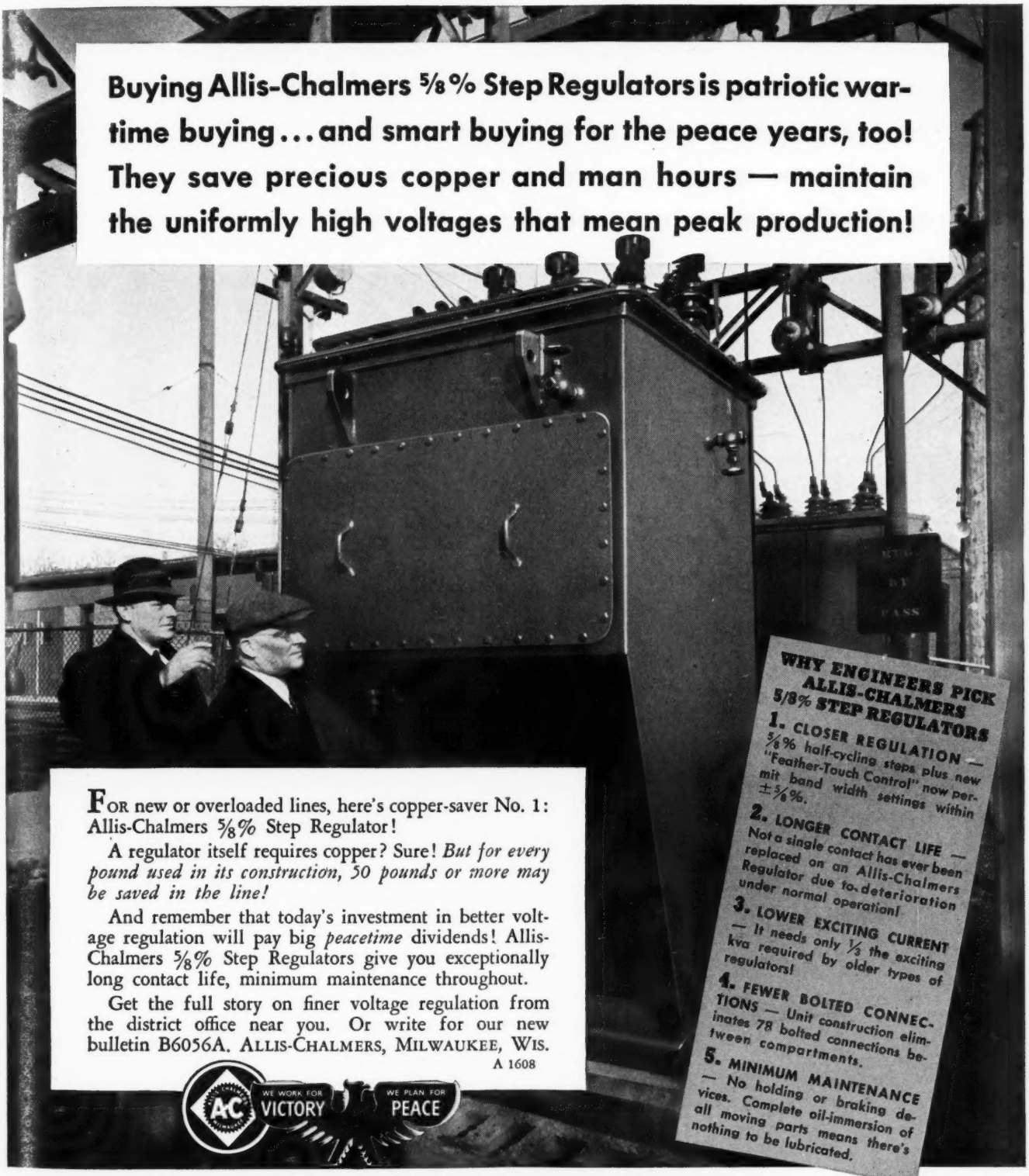
"Contrariwise, a thousand miles to the eastward, a few resolute men with anti-tank guns smashed Hitler's tanks as though they were clay pigeons, and once again an army was hung up by a handful in the Pass of Thermopylae.

"If invasion of Italy is followed by thrusts through the Aegean Sea, the man in the street, the newsboy at the corner, will soon be talking (in different keys) about Stampalia, Pholegandros, Cytherea, Antikythera, and the Sporades. . . .

"And so, in big bright offices containing acres of drafting desks and beside tall steel aerials and among the bustle and clatter of newspaper offices, nimble fingers and nimbler wits follow this War in the Four Elements—earth, air, fire, and water. Never before has there been war on such a scale as this, waged with such weapons of publicity, and for such immediate audiences. Tense, expectant, they are packed in their millions on the world-wide stadium. Only an hour or so after Mars has smeared with his bloody finger the name of a beach or a field or an islet, it has become a part of the map of that New World toward which it was a step."

IT'S YOUR WISE INVESTMENT

For 1943 & 194x!



Buying Allis-Chalmers 5/8% Step Regulators is patriotic war-time buying... and smart buying for the peace years, too! They save precious copper and man hours — maintain the uniformly high voltages that mean peak production!

FOR new or overloaded lines, here's copper-saver No. 1: Allis-Chalmers 5/8% Step Regulator!

A regulator itself requires copper? Sure! *But for every pound used in its construction, 50 pounds or more may be saved in the line!*

And remember that today's investment in better voltage regulation will pay big *peacetime* dividends! Allis-Chalmers 5/8% Step Regulators give you exceptionally long contact life, minimum maintenance throughout.

Get the full story on finer voltage regulation from the district office near you. Or write for our new bulletin B6056A. ALLIS-CHALMERS, MILWAUKEE, WIS.

A 1608

WE WORK FOR VICTORY — WE PLAN FOR PEACE

WHY ENGINEERS PICK ALLIS-CHALMERS 5/8% STEP REGULATORS

1. **CLOSER REGULATION** — 5/8% half-cycling steps plus new "Feather-Touch Control" now permit band width settings within ±5/8%.
2. **LONGER CONTACT LIFE** — Not a single contact has ever been replaced on an Allis-Chalmers Regulator due to deterioration under normal operation!
3. **LOWER EXCITING CURRENT** — It needs only 1/3 the exciting kva required by older types of regulators!
4. **FEWER BOLTED CONNECTIONS** — Unit construction eliminates 78 bolted connections between compartments.
5. **MINIMUM MAINTENANCE** — No holding or braking devices. Complete oil-immersion of all moving parts means there's nothing to be lubricated.

ALLIS-CHALMERS 5/8% STEP REGULATORS

Listen to the Philharmonic Symphony Program over the CBS network Sunday afternoon 3:00 to 4:30 E.W.T. Carl Van Doren and a guest star present an interlude of historical significance.

*REG. U. S. PATENT OFFICE

UNITED STATES

1 PLANE FOR U. S. LAYTEX* ASSAULT WIRE

Time is one of our best allies. The faster we can get men and material up to the front, the sooner the war will be won... our fighting men return. That's why transport planes are playing a bigger and bigger part in the Service of Supply... and why Laytex Assault Wire fits ideally into the picture of air transport.

Laytex Assault Wire—made especially for front-line service—requires only 1/5 the space in transport of ordinary communications wire. If Laytex Assault Wire had not been developed and ordinary wire had to be shipped for the same use, by air, four additional planes would be required for transport... planes needed for men, medical supplies, food... whatever must reach the front in a hurry.

Laytex Assault Wire resists concussion and a wide range of temperature changes. It is strong, tough, will not abrade or peel excessively. Laytex is highly flexible. It is waterproof and is closely bonded to accurately-centered electrical conductors. All these qualities are the inevitable result of the unique Laytex Process which applies the compounded, purified insulation in liquid form.

Laytex Assault Wire weighs less than 30 lbs. per mile; has a breaking strength greater than 50 lbs. per conductor; a talking distance of more than five miles.

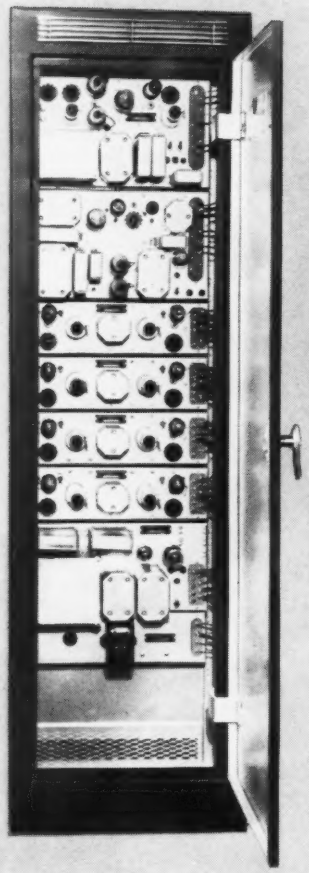
Laytex ASSAULT WIRE

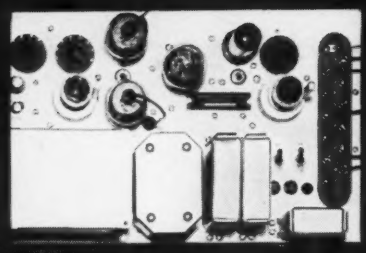
REG. U. S. PAT. OFF

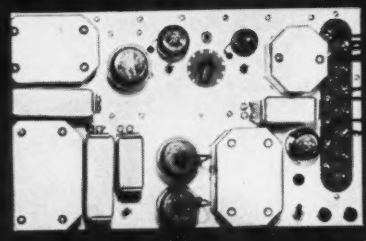
FREES 4 PLANES FOR EMERGENCY TRANSPORT

1230 SIXTH AVENUE ROCKEFELLER CENTER · NEW YORK

RUBBER COMPANY

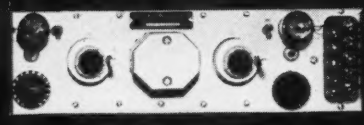




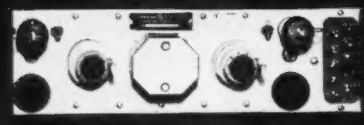


BASIC TRANSMITTER AND MODULATOR

How many more kilowatt hours can your system deliver with carrier current?



AUTOMATIC LOAD CONTROL



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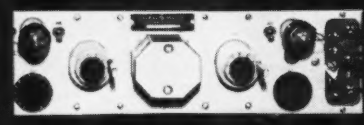
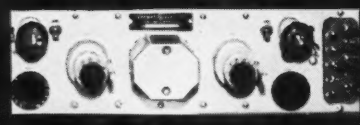


SUPERVISORY CONTROL



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151-83

G-E employees are now purchasing over $1,000,000 in War Bonds weekly

ELECTRICAL WEST

JULY, 1943
VOL. 91 NO. 1

Electricity Is Prime Mover In Steel Mill

From walnut groves to steel production in less than a year, Fontana plant of Kaiser Co. is new chapter in West's industrial growth

SHIP plate and shapes now. High grade alloy steels and many other products after the war. To make them, a major addition to the new industrial empire of the West is the steel plant of Kaiser Co., Inc., at Fontana, Calif. A year ago work had just started. By Dec. 30 pig iron was flowing from "The Bess," one of the largest blast furnaces in the world. On May 14 steel ingots were poured from the first open hearth furnace. Another Henry J. Kaiser miracle of construction speed is telegrammed in such a summary.

Before considering the disposition of the Fontana steel plant's 30,000 kva. of electric power and its electrical engineering design, a few more facts to establish the size and significance of this undertaking are pertinent. It was converted from walnut groves to a steel mill in less than a year. It derives its coal from Sunnyside, Utah; its principal iron ore source is the company owned Vulcan mine in San Bernardino County. This is a high-grade deposit. Estimates of annual production are: pig iron 432,000 net tons, steel ingots 675,000 net tons, rolled products 472,000 net tons. By-products will include 8,400 tons of ammonium sulphate, 2,500,000 gal. of light oil from which toluol and other by-products may be made, 7,500,000 gal. of coal tar from which creosote and other residual oils will be extracted.

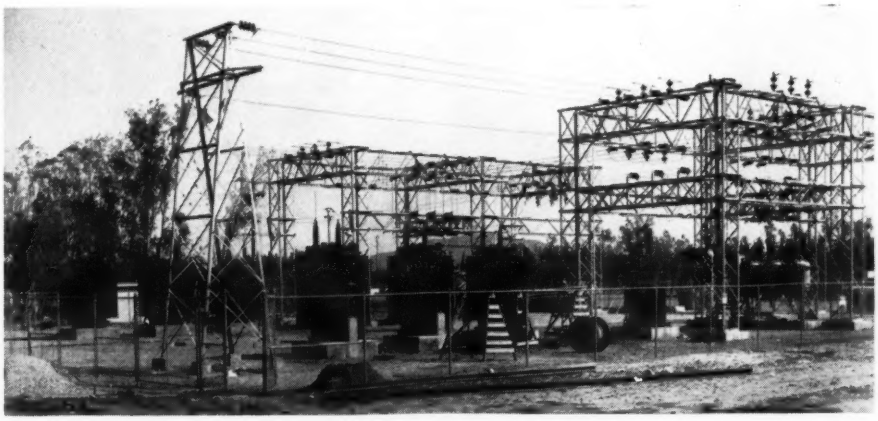
Included in the 1,200-acre steel producing area are a 1,200-ton per day blast furnace (and room for several more), a 90-oven by-product coke plant, a tar distillation plant, six 185-ton open hearth furnaces, a 110-in. plate mill, a 28-in. structural mill with a 36-in. breakdown mill, a merchant mill and alloy finishing facilities.

As a prime mover electricity is used now in every department of operations at the Fontana plant. Unique, too, for a steel mill is that the lighting is carefully engineered and the white glow from the molten iron or steel ingot is not relied upon for the sole illuminant. This in itself is something of a departure, one of the many which the resourceful Kaiser organization has incorporated into this new project. The materials handling technique, for instance, reflects the long and successful experience of the organization. Henry Kaiser began, it will be remembered, with the moving of sand and gravel, moved earth (if not heaven) in great quantities on several big construction jobs, and now is moving iron ore, coke and limestone into a blast furnace; he is moving molten metal, coke, steel ingots and finally steel plates and structural shapes to the shipyards of the West, where again they are assembled into ships to move cargo for the United Nations.

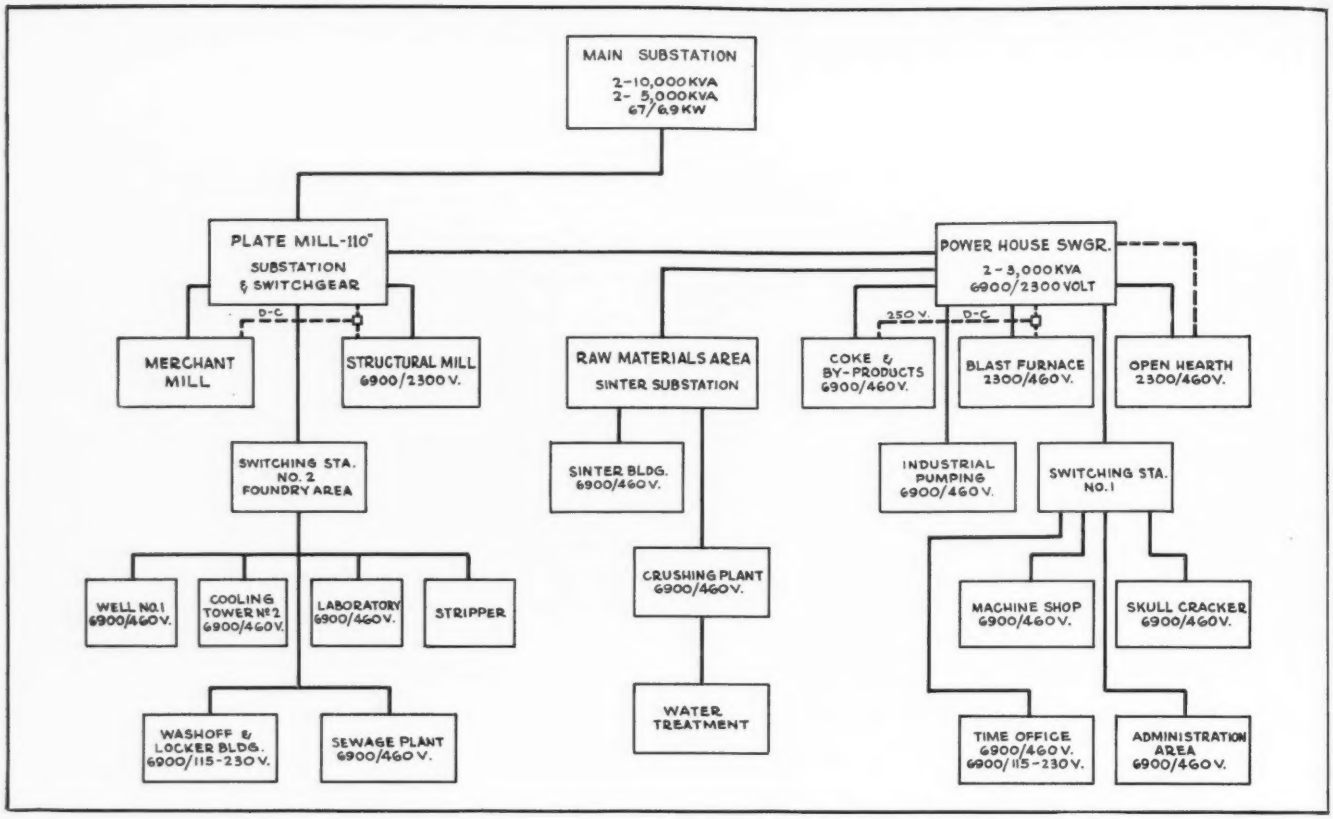
Electrical distribution, design, and installation for the plant has been done by the engineering and construction forces of the Kaiser organization.

Considerations of saving in critical materials weighed heavily in the selection of practically all materials and equipment. In the electrical design this was the factor which prescribed the distribution of 6,900 volts, which materially reduced the copper sizes required.

Power is received from Southern California Edison Co. at 66 kv., three phase, 50 cycle, at the main substation near the center of distribution. Since the plate mill area uses 80% of the power, switchgear for the mill area was centered there, the power house being used as the switching center for the blast and open hearth furnace area. At the main receiving substation the 66 kv. is transformed to 6,900 volts, and fed to the plate mill switching center. From there it is distributed to the plate mill, merchant mill, structural mill and various auxiliary loads in the area through a sub-switching station. Feeders also go from this main switching station power house, from which it is distributed to the raw materials area, coke and by-products



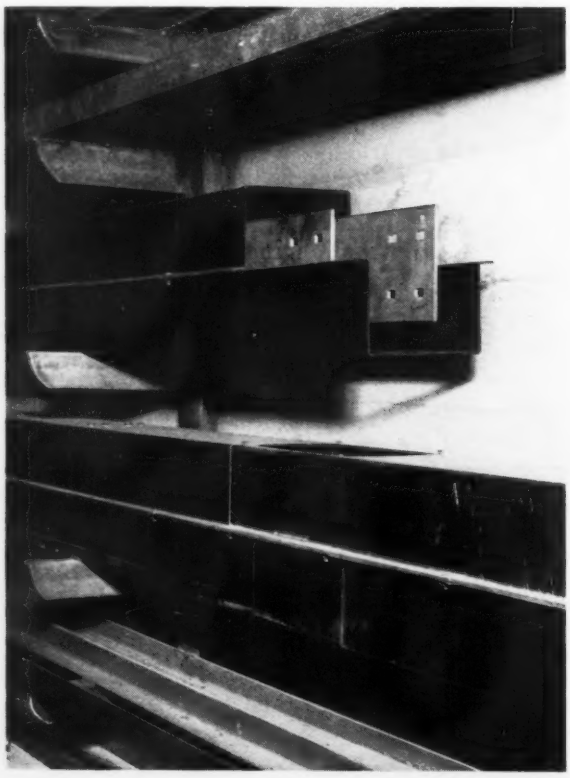
Six single-phase transformers at the plant's main substation take power from Southern California Edison lines at 69,000 volts, step it down to 6,900 volts for distribution to all parts of the 1,400-acre mill site. Air blast equipment will increase rating of each transformer from 3,333 to 4,440 kva. Completed installation will include also two three-phase air-blast-cooled 6,666-kva. transformers



Schematic diagram shows distribution plan of the various load divisions

plant, blast furnace, open hearth, industrial pumping and, through a subswitching center, the administration, machine shop, time office and skull cracker loads.

Distribution is carried underground in clay duct of 2½-, 3½- and 4½-in. sizes, at 6,900 volts. The underground duct system is extensive, for it also provides duct space for some 2,300-volt and 460-volt power subdistribution, 115-230- or 120-208-volt lighting, telephone, interphone, fire alarm and watchman systems, blackout control, street lighting, paging, as well as direct current and d-c control. The schematic diagram indicates the distribution plan of the various divisions of load and the operating voltages employed.



Angle iron racks support Bustribution duct for d-c distribution in tunnels, and form trays in which to lay a-c cables instead of using conduit or duct

All heavy a-c motors of over 750 hp. are 6,600 volt. This, too, conserves copper. Direct current is used, however, for the main motors in the 36-in. and 28-in. mills to obtain control of speed. Mercury arc rectifiers, in order to save critical materials, are used to obtain the d-c for the structural mill and merchant mill motors but motor-generator sets convert the a-c supply for the heavy mills. There will be four 6,000-hp. m-g sets to supply these various mills.

In the power house are two m-g sets which supply d-c for plant cranes and the blast furnace and coke and by-products plants. Both are Crocker-Wheeler, 1,000-kw., 750-rpm., 250-volt, 4,000-amp. generators, direct connected to 1,450-hp., 750-rpm., 6,600-volt, 125-amp., three-phase, 50-cycle synchronous motors.

The mill area d-c system is arranged to utilize the capacity of the two m-g sets and the two rectifiers by tying all four units together.

It is in the raw materials area that the conveyor technique of the Kaiser company comes into play. The electrical control is interlocked but not sequence controlled. In other words, controls are arranged to stop the flow of materials, but to restart the sequence individual starting of sections of the system must be done. There are seven interlock systems. The main conveyor belt thus can be arranged to divert materials to any of the storage piles by means of the stackers, or to the screens and the crusher or pick up the material from the reclaimers and take it on to the blast furnace.

The conveyor control through the sintering plant likewise has interlock at important points. Sintering is a process in which finely ground ore, coke breeze, flue dust, and other materials are combined into particles large enough to feed into the blast

furnace without having them blown out the stack. The various materials comprising the sinter are assembled by conveyor from the screening and crusher plant and the Cottrell precipitators which remove the flue dust. This requires interlock to prevent pile up of materials should trouble stop one part of the conveyor system.

Electric supply to the Cottrell system comes from the substation feeding the coke and by-products plant. Because of flue gas precipitation the plant in operation will be virtually smokeless as well as more efficient in the utilization of all materials.

The major prime mover at the power house is not electric but steam turbine. Equipped with two (eventually three) Babcock-Wilcox, type F, integral furnace boilers, fired either with oil or coke oven gas, of 150,000-lb.-per-hour steam capacity, steam is furnished for process purposes and to operate the turbo-blower. Both turbine and blower are Ingersoll-Rand. Steam turbine at full capacity requires 100,000-lb. steam per hour. It is a twelve-stage turbine, condensing, four-bearing type, with an independent shaft, interconnected to the blower by a totally enclosed "Fast" flexible coupling. It operates at 400-lb. pressure at the throttle. 750° F., 2,900 rpm.

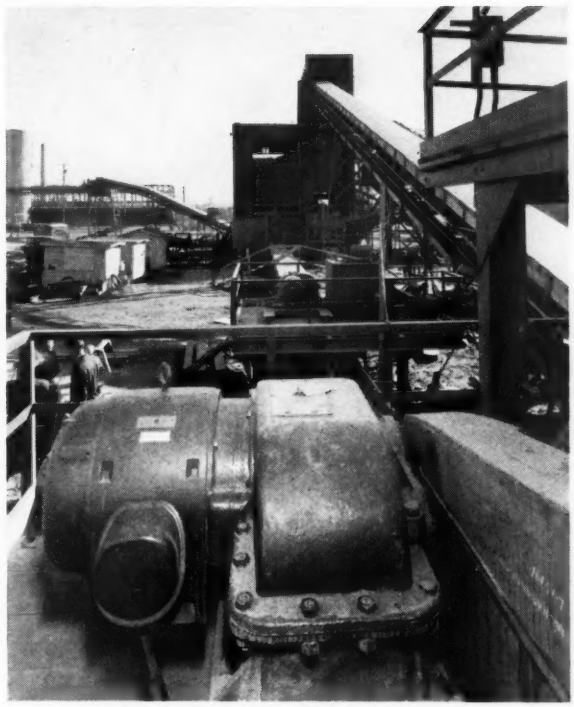
Furnishing air for the blast furnace, the blower is a four-stage uncooled centrifugal blower, delivering 100,000 cu. ft. of air per minute at 30-lb. pressure. A visual, illuminated signal system between the blast furnace and the power house makes known to the operators the blast furnace air demands of the furnace operator. An Askania automatic regulator system controls the turbo-blower.

To free the air thus taken in from dust, electricity again plays an important role. A Westinghouse Precipitron system is installed in the air intake chamber. Between a standby of two banks of fiber glass dry filters a small but effective Precipitron installation cleans the 100,000 cu. ft. of air per minute through either of its two 7x7-ft. units. One unit can be cleaned while the other operates, alternately, as rapidly as required.

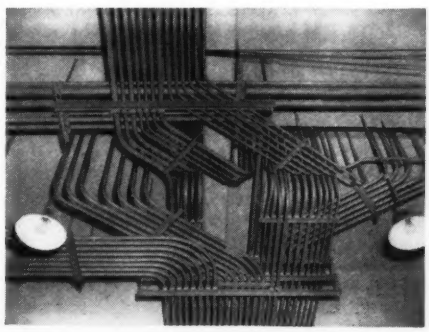
The Precipitrons are served by electronic tube power packs which step up the 460-volt a-c to 15,000-volt across the plates on the high side and 6,000-volt on the low side. This is the first such installation to clean blast furnace air.

Wherever continuity of supply must be guaranteed against all contingencies, as in certain air compressors, circulating water pumps for the condenser and the like, Elliot steam turbine standby units are provided beside the electric motor drive. A battery room of 120 Exide cells likewise provides a standby for house lights and instruments.

Lighting received more attention in the design of this steel plant than is generally true. There is a total of 450 lighting units, and extensive use is

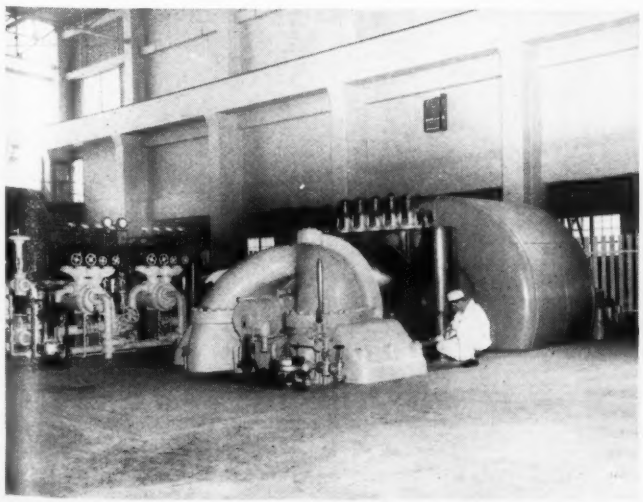


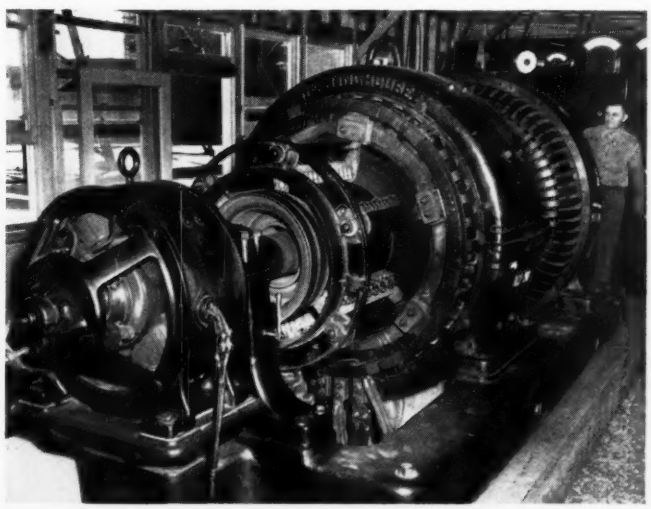
Ore conveyor belts are driven by 5 to 75-hp. gearmotors. Steeper than average inclines (18° on the belt in foreground) allow full use of rated horsepower. This belt will carry 450 tons per hour at a speed of 265 ft. per min.

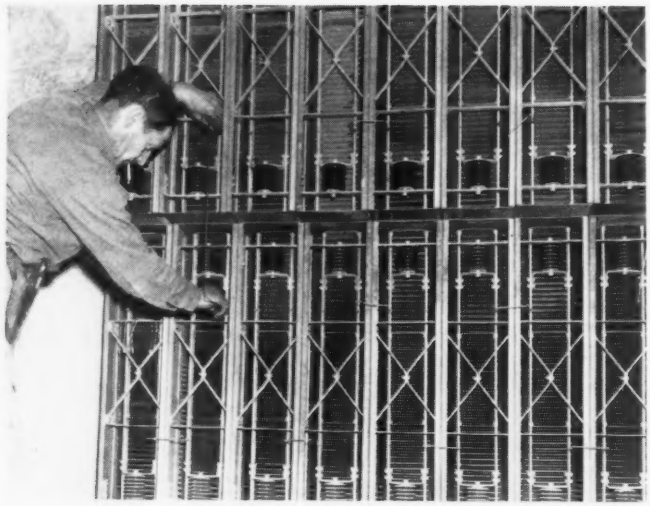


Below: turbo-blower in the main power house. On the back wall is the visual electric signal system from the blast furnace operator. At right: pattern of conduit below the power house floor

Evidence of the way material shortages were met is this motor generator set, first put in service in 1902 to furnish power for Nevada mines. Originally rated at 6,900 volts, the synchronous motor has been reconnected for 2,300 volts and rated at 500 hp. at 720 rpm. The switchboard for control of motor and generator was with original set

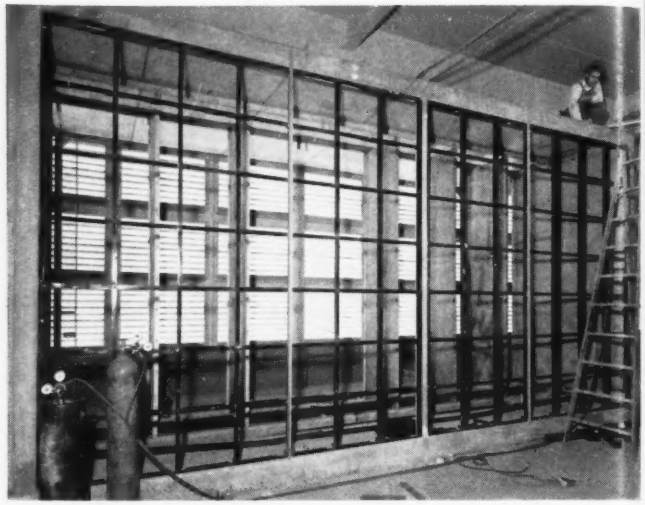






Air entering the power house will be cleansed by this bank of 16 Precipitron cells, electric air cleaning apparatus that will remove air-borne dirt particles down to 1/250,000 of an inch in size. Above: Charles Davis, construction electrician, completes the installation at the Kaiser plant

Below: a workman makes the final weld on the 18-ft. framework which supports the Precipitron installation, said to be the first electric air cleaning device to be used in a steel mill. Through the intake shutters in the background pass 90,000 cubic feet of air per minute into the motor room



made of an adaptation of a Holophane asometric lens in a shallow pan to direct the light the length of the conveyor belts.

Lighting Details

In the open hearth buildings where the highest bays are 74 ft., 750- to 1,500-watt Westinghouse concentrating Millites are used. The plate mill is designed to have 1¾ to 1½ watts per sq. ft. of illumination, placed to give the most light to those areas requiring it most. Mounting heights are 45 ft., spacing about 25 ft. on centers, using 1,000-watt Millites over the 206,000-sq. ft. area.

All lighting is pushbutton controlled through contactors. Pushbuttons are located at floor level, contactors are mounted in panels at the catwalk level, with transformers on the roof above them. Circuits are arranged in two groups so that half of the lighting units may be turned on at one pushbutton station. In the plate mill supply comes from two banks of 460-volt transformers, which in turn supply smaller banks which reduce to the lighting voltage. The system has been so arranged that the two main banks are interconnected so that a portion of the lighting units controlled from one transformer bank may be transferred automatically to the other should either fail.

While not an industrial application, the lighting of the administration building is ingenious and provides for possible changes in the location of office partitions. Two continuous rows of built-in fluorescent troffers, covered by Holophane lens plates, circle the office sections on each side of the center hallway of the hollow-square, single story building. Partitions are removable, but no matter where moved the two rows of troffers in the ceiling furnish uniform illumination.

Service to the power requirements of the open hearth and blast furnace areas is made flexible by using a distribution tunnel in which the cables are placed in open racks fabricated of angle iron welded together. The angle irons are fabricated to make two parallel trays per rack, in the bottom of which a strip of plywood makes a floor. The cables are laid upon these trays.

Direct current for this area is also carried from the m-g sets in the power house through these tunnels in Bull-Dog Bustribution ducts. Parallel copper busbars, with capacity of 1,500 amp. per bar, distribute the d-c at 250 volts. The bus duct too is supported on the angle iron racks along the tunnel walls.

Coolness and ventilation of the tunnels permits reduction of cable sizes to a minimum. Placing the cables in racks eliminates much steel conduit and carrying the distribution underground eliminates steel towers for an overhead system. Types of conductor used in the underground distribution of all types includes SN, RW, RL and UL wires.

Ultimate power requirements may run as high as 50,000 kva. This may be obtained by another transmission line to insure continuous operation in future, although present facilities have a capacity of 30,000 kva. on each of two transmission lines. The present requirements will run between 24,000 and 29,000 kw.

Wartime Bulletin

That workers in the utility companies, which are listed high in the essential list, feel uneasy, wish to join more dramatic forms of war work, and that this is the cause of unnecessary turnover and truly hinders the war effort is well known. San Diego Gas & Electric Co. has just done something about it by printing for circulation to its employees a tribute to their contribution to the war effort written by an outside journalist. *We serve our country through our jobs*, is the title placed over this booklet. With a foreword by the management and a quotation from J. A. Krug, director, Office of War Utilities, as to the essential nature of utility service, the booklet then tells this outside journalist's reasoning in support of the same idea.

It tells of the tremendous increases in power demand brought to San Diego by war work, increased population, army and navy facilities. It then tells the part the company's services play in aircraft production, dredging, service to war workers. It lists the number who have gone into the armed services from the company (441 out of 1,352, the highest percentage of any Western utility—33.5%). It describes consumer assistance in dimout compliance, appliance maintenance, nutrition classes. Likewise War Bond purchases and other civilian defense participation are told.

Arrangements were made by which employees can obtain extra copies for limited distribution to friends and thus spread appreciation of the part played in vital war effort.

Ruhr Power Dams Breached

Details of RAF bombing of Ruhr district dams revealed for study by Western hydro engineers

BECAUSE of the interest in power dams and the number of such installations here in the West, ELECTRICAL WEST made immediate overtures to the British Information Service as soon as word was received of the successful breaching of two major German storage dams on the night of May 16-17. The following information and the accompanying pictures tell a graphic story not covered in the daily press.

On the night of May 16 nineteen four-motored Lancaster bombers flew deep into Germany and dropped mines from an altitude of 100 ft. and less against two of the most important dams in the Ruhr industrial district. These two dams—the Eder and the Moehne, two of the biggest in Germany—were breached by the mines and floods were let loose in the Ruhr, Weser and Fulda valleys which spread ruin and devastation.

What had happened was that the RAF had developed a new technique in aerial warfare. The operation had been planned for months and crews had undergone special training for a long period. The tricky feat was accomplished by dropping the mines from a low altitude into the reservoir as close as possible to the face of the dam. The 1,500-lb. mines were set to explode at 30 ft. depth, and reputedly were carried against the dam by currents set up from dropping light bombs into the water.

The loss of eight of the 19 bombers with their crews of 56 men was not considered a high figure in so dangerous a mission, particularly in view of the magnitude of the task—a task which, it has been estimated, would warrant the expenditure of one or more divisions in earlier wars.

Details on the size and type of the dams are given in the captions accompanying the pictures on this and succeeding pages.

Resultant damage was extensive and to a degree irreparable, for this year at least, because a season's storage has been lost. The day after the raid, the British Air Ministry was able to report that the break in the Eder Dam alone had flooded Kassel, which has important locomotive works and aircraft factories, and towns beyond it; had disrupted hydroelectric stations throughout the area, and seriously affected traffic on the Mittelland Canal, main east-west water artery and a link between all main navigable rivers west of Berlin. Late reconnaissance showed waters sweeping down the Ruhr Valley, and railroad and road bridges broken down. Hydroelectric power stations were observed destroyed or damaged, and a railroad marshalling yard was under water. Reports reaching Switzerland from Germany on May 18 stated that at least 4,000 persons had been killed and 120,000 rendered homeless in the upper Ruhr and Weser Valley regions as a result of the wrecking of the Eder and Moehne dams.

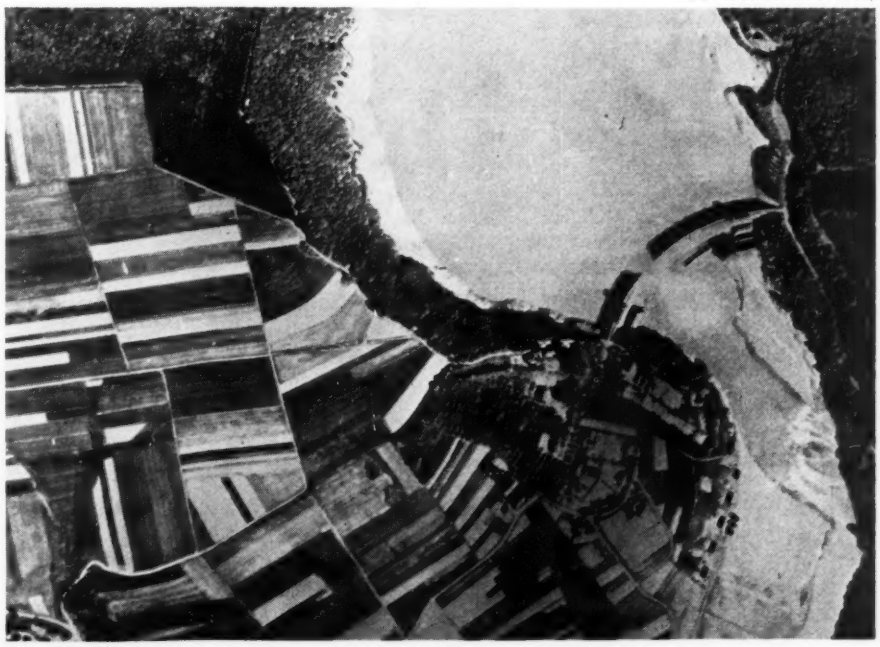
And this was only the beginning. On May 19 reports showed that water levels below the Moehne Dam were rising rapidly at the frequently bombed industrial town of Duisburg, where the Ruhr joins the Rhine, and at least 54 towns and villages upstream were under water, rendering some 54,000 families homeless. Photographs taken on May 19 showed the railroad embankment damaged beyond Schwerte (35 miles below the Moehne Dam on the Ruhr), the Dalhausen freight yards —among the largest in the Ruhr—under water, and the airdrome, hangars, barracks, ammunition dumps and landing grounds of the great Fritzlahr airdrome completely inundated. The effects of all this damage to German industry and transport have been too great to admit of any precise calculation.

The Nazis soon began to get jittery about their other dams. On May 21 they were reported to be rushing anti-aircraft protection and protecting nets to the Bleiloch Dam and power station, which feeds the Leuna nitrogen and fertilizer works and other industries of central Germany, and to the big Walchensee, Bober and Murgtal dams. The Walchensee Dam is near the Austrian border, south of Munich; the Bober Dam is on the Bober River in Silesia; the Murgtal is on the Murg River in southern Germany, near the Swiss border. They are all important to German industry.

Wing Commander G. P. Gibson (right) led the successful raid and returned safely. Eight of the 19 bombers were lost. He has won DSO and DSC twice

Size of the break in the Eder Dam on the Weser River can be judged from the shadow on the reservoir surface. This structure is 157 ft. high and 1,312 ft. long, 19 ft. thick at the crest and 120 ft. through at the base. It impounded 164,000 acre-ft. of water

(Official British Photos)



(Official British Photo)

BEFORE Here is the Moehne Dam on the Ruhr River prior to the attack. It is a 132-ft. high, 2,145-ft. long gravity type stone and masonry structure arched in plan. The base is 113 ft. thick and the non-overflow crest 21 ft. thick. It impounds 110,000 acre-ft. of water for supplying 11 major hydroelectric plants and nearly 300 domestic and industrial water systems. One power house is immediately below the dam (indicated by dark shadow of roof). Note extensive afterbay or compensating basin below the dam for stream flow regulation

(Official British Photo)

AFTER RAF bombers, with rifle accuracy, blasted a 300-ft. hole almost in the dam's center. Note that the power house has been completely destroyed as has the dam forming the afterbay. Still intact is a small power house (right foreground) at the outlet of the afterbay. Dam was breached with 1,500-lb. aerial mines dropped from bombers flying 50 to 75 ft. above the reservoir surface and set to explode at 30 ft. depth. Smaller bombs for the purpose of setting up waves carried the mines toward the dam. The reservoir has been practically drained

3-Phase Transformers Save Copper and Steel

Higher efficiency, lower cost, smaller dimensions and lighter weight are additional advantages in 3-phase power installations

E. W. Morris
Westinghouse Electric & Manufacturing Co.

THE electrical industry can contribute a huge amount of critical materials for manufacture of war equipment if advantage is taken of recent developments which save appreciable amounts of copper and steel. Until recently it was common practice to form large three-phase banks of transformers by using three separate single-phase transformers with external interconnections. Frequently this bank was augmented with a duplicate single-phase unit which served as a spare. A spare unit today is prohibited, or its use is discouraged in the interests of maximum production, since idle equipment does not contribute to production of essential war materials.

More than 60% of the large power transformers built today are three-phase units. Of the remaining 40% which are single-phase units, many are duplicates of existing spares, which will be used to make up three-phase banks. The present trend toward the use of three-phase units is the result of increased reliability of the modern transformer, and the remote possibility of failure if properly protected. Adequate protection may include modern lightning arresters, built-in thermal relays, short circuit protection, differential relaying and an inert gas over the oil. Continual reductions in weight make it possible to handle larger three-phase transformers than 10 or 20 years ago. As an example, a 40,000-kva. three-phase transformer recently was shipped complete with high-voltage bushings in place.

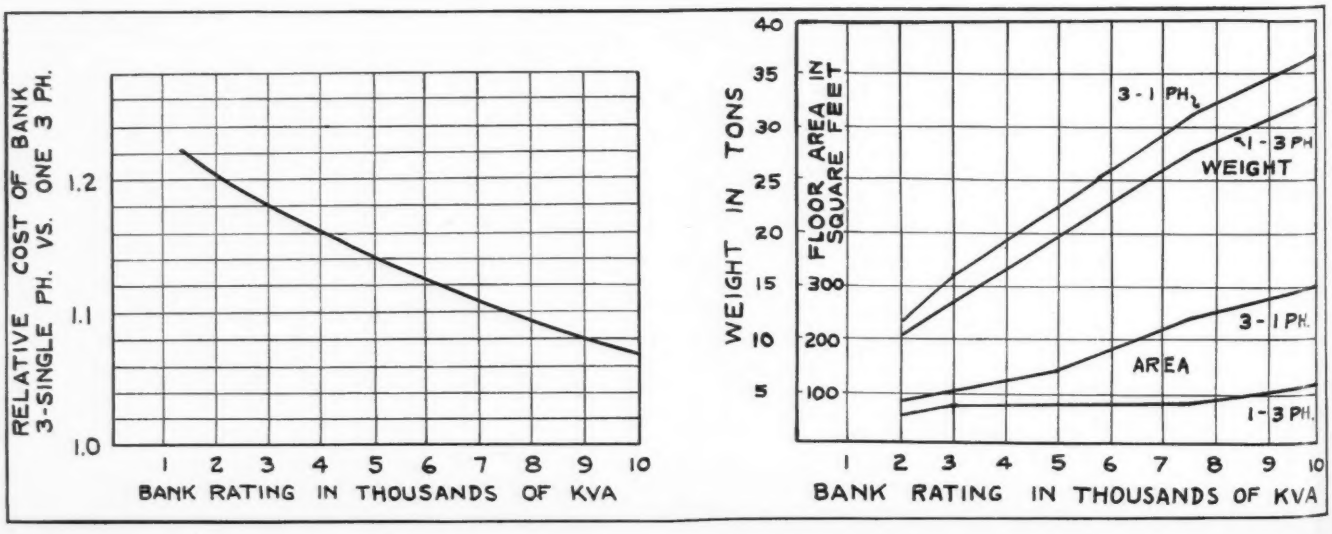
Further preference for a three-phase unit is the result of higher efficiency, lower cost, and smaller dimensions and weight than three single-phase transformers. The losses in a three-phase transformer may be as much as 10% lower than the total losses of three single-phase transformers. As a result, the efficiency of a three-phase unit usually is higher than three single-phase units of the same total capacity. This factor is of greatest importance in large units, where each 0.1% gain in efficiency represents appreciable savings. As an example, on a 25,000-kva. bank, an increase in efficiency of 0.1% represents a decrease in full-load losses of 25 kw., or approximately 220,000 kwh. per year if fully loaded.

Of lesser importance, but still a factor, is the saving in space and weight. Three single-phase transformers usually require approximately two and a half times as much area as the equivalent three-phase unit. This is a factor when small power transformers are mounted indoors, as within a factory.

Weights of three-phase units will average 15% less than the equivalent bank of single-phase units.

Price savings cannot be measured by first cost alone, which usually is from 10 to 15% in favor of a three-phase unit. This saving in first cost can be increased to as much as 35% if one three-phase unit is used in place of six single-phase units of equivalent capacity. Further savings in cost are found in less freight, lower cost of installation and interconnections.

There is no reason to believe that three single-phase units in separate tanks have greater reliability of service than a three-phase unit. It is true that greater physical separation can be obtained between phases if the single-phase units are in separate tanks. But with the use of single-phase units comes the necessity for inter-phase connections in air, which provide vulnerable spots subject to external damage and fault, frequently requiring additional protective relaying. The three-phase unit has all inter-phase connections under oil, and this feature usually provides for increased reliability. Modern three-phase transformers have their individual phase windings almost completely encased in solid insulation. In the shell form of construction, the windings are further enclosed. As a result of this construction the possibility of a winding fault in a three-phase transformer spreading to an-



Relative cost (left) and comparison of net weight and approximate floor space (right) of a 34.5-kv. 3-phase transformer bank consisting of three single-phase transformers, compared with 3-phase transformer of equivalent rating

other phase is rather remote. In this type of construction there is little possibility that conducting particles would be thrown from faulted phase to another. Present manufacturing test procedure shows up defects in windings during assembly, and has resulted in increased adequacy of design. One rarely hears of a modern transformer developing an internal fault due to inadequacies in manufacture, so it becomes a problem of providing protection to the transformer against damage from external circuit.

Above: Three-phase transformer used in a completely self-protecting, self-contained substation for single-feeder service. Protection is provided by built-in arresters, protective links on the high voltage side, automatic thermal overload device and secondary breaker. Assemblies are available both with and without automatic regulation

Proof of reliability of three-phase units can be shown by satisfactory performance of over 150 CSP (completely self protected) power transformers which have been installed during the past several years. Although many of these have been installed in localities subject to severe lightning and other external circuit conditions, no winding failures have occurred. Protection is afforded by arresters on the high-voltage side, special protective gaps on the low-voltage side, and a self-protecting thermal breaker mounted in the oil. Critical materials are saved by the use of the completely self-protecting, self-contained substation, since it combines within one enclosure the following functions normally associated with a complete outdoor substation: Voltage transformation; automatic regulation; automatic switching; thermal protection; metering; complete lightning protection. Aside from the substantial saving in first cost due to the simplicity of installation, further savings may result if it is found necessary to move the unit because of a shift in the load center.

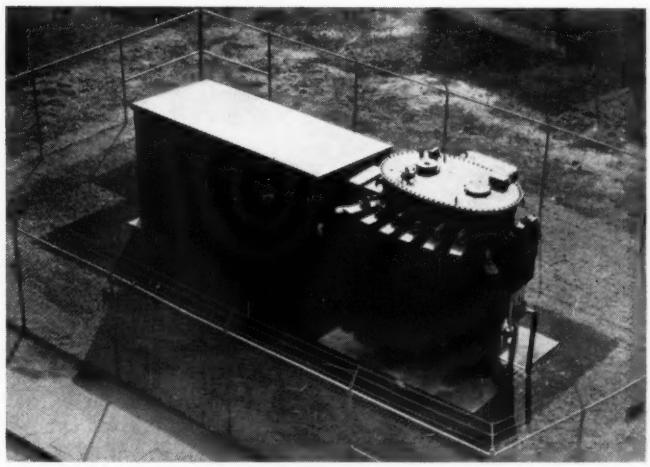
Further evidence of the reliability of three-phase transformers may be found in the many installations of primary-distribution unit substations. These combine the advantages of the completely self-protecting unit substation, with weatherproof metal enclosed switchgear. Critical materials are saved by the compact construction of switchgear mounted adjacent to the transformer, with a bolted throat connection between them. Accessibility is not sacrificed, for each switchgear compartment is equipped with full-length steel doors.

Several new developments have made possible additional saving in materials, while other developments have improved the operation of the larger ratings.

One of these is the development of Hypersil, a new transformer steel which has the ability to carry one-third more flux than heretofore possible with the best grade silicon steels. This new steel has been used in many ratings from small instrument transformers to large power transformers, always with a saving in weight which results not only from the smaller amount of core steel required, but from copper which has a shorter turn length, from smaller tanks and less structural steel. The average weight reduction in the smaller self-cooled transformers may be as much as 20% by the use of the new high-permeability steel rather than the best grade of silicon steel formerly used. It is conservatively estimated that if the average annual production of all types of transformers used the new high-permeability steel, the savings resulting per year would approximate 18,000 tons of steel, 6,500 tons of copper and 1½ million gallons of oil.

In the larger power transformers considerable reduction has been made in weight by the addition of forced-oil cooling. Further reduction in weight is accomplished by forced draft on radiators in the circulating oil system. Savings in weight of over 50% can be obtained by the use of the new core steel, oil forced through the windings under pressure, and this oil cooled by radiators subject to air blast.

Below: A three-phase transformer forms one part of this factory-assembled primary distribution unit, the weatherproof design including all equipment necessary to a substation supplying four feeders. The transformer is complete with automatic tap-changing-under-load equipment for voltage regulation. This combination saves material and time



Another type of three-phase unit which shows savings in both space and weight is the new air-cooled, air-insulated transformer. These three-phase transformers have been built for natural draft ventilation up to 3,750 kva. As an example of how this type of transformer compares with the self-cooled oil-filled transformer, note the following approximate amounts of steel used in oil, and air-cooled units.

KVA. 3 phase	Oil Cooled Weight of oil (lb.)	Oil Cooled Weight of steel (lb.)	Air Cooled Weight of steel (lb.)
500	3,300	1,800	700
1,000	3,650	4,400	1,200

From the tabulation it can be readily seen that considerable saving in weight and handling can be obtained by the use of air-cooled, air-insulated transformers. Several installations have been made during the past few years, and there have been no winding failures. New developments indicate that further expansion and modification of this line can be expected in the future. Additional savings can be effected by the use of air-cooled transformers; costly concrete vaults are not required, since they take less indoor space which is at a premium today.

Distribution Fundamentals

Dear George:

SOUNDS like baby talk, doesn't it—but that's just the point. When you hear a couple of engineers or linemen arguing whether it's better to use crossarms or racks for secondary construction, seems like they're just trying to push their memories back to the old kindergarten days, where the "my dad can lick your dad" theory was true merely by the spoken words of the kid who could shout 'em the loudest. There probably isn't any best of anything to fit all cases, as time has a way of entering the picture and settling a lot of points. The racks of today may turn out to be the wrecks of tomorrow. Whoever thought about the relation between steel racks and the Controlled Materials Plan?

The crossarm was the only logical means of support in the early days for insulating and clearance purposes. Distribution first started as a low-voltage 100/200-volt system requiring many circuits which in turn suggested crossarms as the best method of grouping the wires somewhere near the top of the pole. With the adoption of a-c distribution, the number of circuits was cut down; but the crossarm was in general use, was cheap, and did the job so well that attention was given to more urgent matters, such as furnishing bail for boomer linemen, and I don't mean hay. They were always fast guys with a pay check.

There is an axiom that seems to be generally true which runs as follows:

"If a thing looks right, it **is** right."

Well, pulling services off of pins or buckarms generally presented a picture that Rembrandt wouldn't want to sign his name to, and these rats nests started some of the boys thinking about some other method. Thus the secondary rack was born to supplement the crossarm rather than replace it. This improvement stuck out like a short dress at a formal, so it wasn't long before someone (probably a grunt) asked the foolish question as to why the secondary crossarm was needed at all. If Archimedes had thought of it, he would have run through the streets of Syracuse (N.Y.) clad only in a towel, crying "Eureka." However, if the truth were known, the first man to use racks for secondary construction probably had to be quiet, and bank on a little deception in order to slip one over on the old-fashioned boss.

The rack still isn't a cure-all. If there aren't over four secondary wires involved, it does look better; but above that number, the crossarm still seems to do a better job. When bare wires are used for secondaries, in place of weatherproof wire, the insulator spacing in the racks must be greater. Thus the clearance-above-ground problem enters and again the crossarm has an edge. The question of costs doesn't favor the rack either, especially where there are more than four wires. The wires in rack construction will carry from 10 to 20% more load for the same drop as in crossarm construction. The position of a series streetlight wire enters into some designs.

"Cwossarms, or . . .

Wacks?"

The rack won't win, hands down, because there are too many arms up. Both crossarms and racks have their points—but so does a can of sauerkraut.

Yours,

The Old Soup.

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EMEA *Dope Sheet*

Load Center Unit Substation

Part I

*W. H. Schiek**

General Electric Co., Los Angeles

IT has been no small job to equip the many new war plants throughout our country with suitable transformers and switchgear. Where speed and reliability have been of equal importance and available manpower had to be used to the peak of its efficiency, practically all of these plants have chosen factory-assembled equipment. Of such equipment load center type unit substations in particular have provided both speed and reliability.

The basic definition of a load center unit substation can be given as follows: A completely metal-enclosed integrated substation equipment incorporating: (1) the required high-voltage switching, control, and incoming circuit termination facilities; (2) transformer section or sections to transform a-c power from the medium voltage range, 2,400-15,000 volts, to the low voltage range of 600 volts and below; and (3) the required low-voltage switching, control, and outgoing feeder circuit termination facilities.

Description of modern load center unit substation equipment: The transformer section of a load center unit substation consists of a three-phase transformer with leads from the high and low-voltage windings brought out of the tank through side wall bushings to metal-enclosed bus connections known as throats. The throats are built integral with the transformer tanks, with the low-voltage throat located on one short dimension side of the tank and the high-voltage throat located on the opposite side of the tank. The high-voltage throat is arranged so that any one of a number of high-voltage arrangements of switching equipment and a cable termination apparatus may be connected to it, while the low-voltage throat is arranged for connection to metal-enclosed low-voltage switchgear.

The high-voltage equipment may consist of metal-enclosed switchgear. Subsequent breakers are available with interrupting ratings from 25,000 to 150,000 kva. in 5-kv. metalclad equipments, and 250,000 to 500,000 kva. in 15-kv. metalclad equipments. The vertical-lift removable type of breaker is standard in these equipments. Instruments, meters, and relays mounted on steel panels may be a part of the equipment.

The metalclad switchgear may have only one breaker or again there may be two breakers to meet the requirements of a primary-selective scheme. In place of the high-voltage metal enclosed switchgear, a set of three flange-mounted, gang-operated, oil-filled cut-out switches may be used. This type of switch is rated 5 kv. 250 amp. continuous. Most applications utilize the switch as a disconnect only with copper disconnecting blades in place of fuse links.

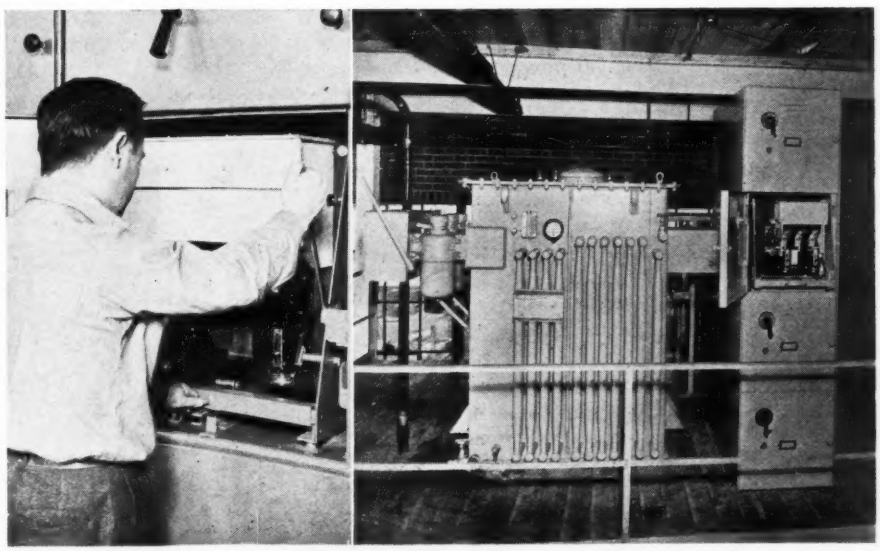
The cut-outs may be fused in the smaller ratings when coordination with the low-voltage circuit breakers can be obtained such that the low-voltage circuit breakers will clear secondary faults before primary fuses are damaged. Cut-outs may be fused up to 100 amp. at 5 kv. and 200 amp. at 2.5 kv. with interrupting ratings of 5,000 amp. at 5 kv. and 10,000 amp. at 2.5 kv. Another arrangement involves a liquid-filled 15-kv. disconnecting switch as suitable for circuits with normal currents up to 200 amp. This switch will break transformer magnetizing current, and is usually interlocked with the secondary transformer breaker to prevent operation of the disconnecting switch until the load has been removed. In addition to these high-voltage arrangements, a load center unit substation may be equipped simply with cable terminal and junction box without any disconnecting means.

The transformer section itself is available in all standard three-phase kva. ratings from 100 to 2,000 kva. Transformers rated above 250 kva. are equipped with four 2½% taps spaced two above and two below normal high voltage. The transformer may be liquid filled with the medium of cooling, either oil or Askarel. The Askarel, or non-inflammable coolant, is generally preferred for both indoor and outdoor load center applications but oil-filled transformers are often used outdoors. The Askarel transformer has been a big factor in the development of the load center distribution idea. This liquid will not burn and thus the Askarel load center unit substation can be located indoors near production centers without an expensive fireproof vault.

The dry type of transformer, cooled by the natural circulation of air through the windings, has also been developed for load center unit substations.

Metal-enclosed low-voltage switchgear is used in load center unit sub-

300 kva. load center substation, with junction box for a 4,160-volt incoming line. Equipment includes flange-mounted D&W oil fuse cutouts; a "pyranol" transformer; and four Type AE-1-A drawout air circuit breakers, protecting 480-volt feeders. Left: drawing out carriage of manually-operated breaker for inspection



* From a discussion before the EMEA of Southern California at Los Angeles in April.

stations. Usually a number of branch circuits radiate from a single load center unit substation. These branch circuits are controlled by means of air circuit breakers mounted in compartments in the low-voltage switchgear. Circuit breakers with current interrupting ratings of 15,000, 25,000, 50,000, 75,000 and 100,000 amp. rms. are available in these equipments. The breakers may be either manually or electrically operated. The majority of the applications have required the use of manually-operated breakers only. All circuit breakers operate with a time delay on overload currents, but trip instantaneously on short circuit. The breakers may be of either the stationary or the draw-out type.

The draw-out type has been used extensively because interchangeability is an important factor in avoiding production delays during routine inspection. The breakers are available in stacks of one, two, three and four high, depending on the size of the breaker. Two or more stacks can be located side by side to give the required number of breakers. These equipments are used extensively with radial type systems.

In the design of modern power distribution systems, several important considerations should be given study, and it is interesting to note how factory-assembled load center unit substations inherently satisfactorily meet these considerations:

(a) establishment of adequate delivered voltage
(b) simplicity of design
(c) reliability
(d) freedom from excessive maintenance
(e) low first cost
(f) safety
(g) critical material saving

Perhaps today in our present wartime emergency the last point mentioned, that of critical material saving, should be considered as a primary objective in planning an industrial power distribution system. We all know that the function of an industrial plant distribution system is to receive power at one or more sources and deliver it to the individual utilization loads, such as motors, lights, welders, etc. The load center unit substation principle goes a long way towards contributing to the effectiveness with which a distribution system fulfills this function.

Because critical material saving is so important today, it has become the patriotic duty of the electrical engineering profession to do its utmost to conserve such vital materials as copper and steel. The opportunities for savings are many and large. The great number of new war plants and additions to existing installations are each requiring from a few to hundreds of tons of copper for their electrical distribution systems. Designing systems with the primary objective of reducing the copper content is a new approach to many in the industry. Study of hundreds of plant layouts indicates that the major savings will be effected if certain simple fundamentals are followed. Several will be set forth in Part Two, to appear next month.

War Training Courses

Under the war training program, the University of Southern California is currently offering a course in industrial illuminating engineering (sponsored by the IES) and one in industrial electrical layouts, applications and installations (sponsored by the EMEA). Tuition is free.

The 15-week course in illuminating engineering started June 18, with meetings on Fridays from 7 to 10 p.m. Lecturers include Frank Van Gilluwe, illuminating engineer, Holophane Co.; H. J. Chanon, General Electric Lamp Department; Gil Southern, Wakefield Co.; and Harold Crane, Southern California Edison Co. Instruction will cover practical problems of design, maintenance, cost; analysis of seeing conditions; lighting and wiring layouts; lighting for production, protection, inspection and camouflage.

With meetings scheduled Monday and Friday evenings for 15 weeks, the course in electrical applications includes lighting and power layouts, drawings, specifications, economics, operating cost analysis, power factor correction, electric heat, controls, Safety Order interpretations. Julien H. Davis, electrical-mechanical engineering consultant, is instructor.

Additional information may be secured from the War Training Office, Room 251, Administration Building, 3551 University Ave., Los Angeles.

This "bookcase" file contains an assortment of forms for all types of coils for motors or for control equipment

Sight for Victory

Every industrial plant in central and northern California will have received a copy of the *Sight for Victory* booklet of the Better Light-Better Sight Bureau by July 31, if cooperative plans involving Pacific Gas and Electric Co. and other branches of the industry are carried out. A mobilized drive to insure that "seeing conditions are right in the war plants of America" was inaugurated at a meeting at the San Francisco Engineers' Club June 1.

The national program is based upon a campaign to take the mystery out of lighting and to enable industrial plant executives to prove quickly to their own satisfaction whether or not seeing conditions in their plant are aiding or hindering war production. Primary step is presentation of the booklet *Sight for Victory* to the proper executive by an electrical man who is trained as a lighting counselor to war industry. In PG and E territory the presentation is being made by a utility lighting expert, a wholesalers' salesman or a representative of a lighting equipment or lamp manufacturer.

A simple light-sight check contained in the booklet enables an industrial executive to make his own determination of seeing conditions and also permits the lighting counselor to make whatever recommendations are desirable.

Winding Form Library

A "library" of winding forms is a good investment because of the time it saves when winding is needed in a hurry, California Electric Works of San Diego has found. A complete assortment of forms for the various types and kinds of coils for motors or for control equipment have been fashioned of plywood and are kept in a "bookcase" according to size.

Indexed too, the required form or forms as directed by the work order are taken by the winder, mounted quickly either singly or in tandem on either of the two winding lathes and are all ready to start winding. There are no measurements to make or adjustable forms to adjust. Immediately upon finishing, the forms can be put back in the file.

A slot cut in each form holds the magnet wire to start the coil and, in cases where several motor coils are wound in a gang, provides just the space required between coils.

Engineering Design
—Creator of America's Mechanized Might

In war, as well as in peace, the design engineer is the vital link between the inventive mind and the mass-production reality

It is gratifying and interesting to note that reports of new "secret weapons" not only have reversed their course during the past few months . . . they also have increased in frequency. Once they filled us with dread and misgiving. Today the enemy does the worrying.

Word about the latest new Army weapon reached us as this was being written . . . a 2½ ton truck that performs on water as well as on land with equal efficiency. "The Duck", resembling an overgrown amphibious jeep, is particularly suited to landing operations where docks are lacking. Loaded with 20 fully equipped soldiers or their equivalent in supplies, its propeller runs it ashore. It climbs the beach on its six-wheel drive and continues the trip on land.

This important addition to our "second-front" fighting equipment, coming so closely on the heels of the now famous tank-killing "Bazooka", is one of many history making contributions of American design engineers — the men who transform nebulous ideas into practical realities — the men who make our war machines superior to those of our enemies.

Invasion and eventual victory became a certainty as soon as America's design engineers threw their full effort into the war against aggression. Adapting intricate ordnance designs to mass production, these men developed weapons such as the M-10 destroyer of Rommel's tanks and brought out the new fighting planes and bombers that have won the air superiority that has turned the tide against the Axis. Taking ideas and giving them form, selecting the materials of construction, deciding upon the method of fabrication, adapting the electrical and mechanical parts that power the product, specifying the finish that protects and beautifies it . . . these men are the focal point of American production. Their ingenuity has no parallel. Once they put automobiles on a mass production basis and within the reach of all. Today, after less than three years and with little previous experience in armament design, they have brought America's war weapons to the highest efficiency . . . surpassing Hitler's weapons despite all the vaunted scientific wizardry of the Germans and their ten year start.

At this point it is well to remember that while Germany's military might is traceable to its superiority in armament, many of the basic technological discoveries (including the airplane and the submarine) are the products of American genius. The Germans always have been aware of the military advantages of technological superiority and have forced its expansion with all their might. They knew that mobility and surprise play a decisive role in modern warfare and their design engineers were kept busy, with unique intensity, to achieve unprecedented results in fast-moving, hard-hitting fighting equipment. Our own military and industrial engineers did not go into action until it became certain that we would be involved in the conflict. But even before our country actually embarked on its Preparedness Program they were busily engaged in developing the designs of our war equipment. Tanks, planes, guns, ships and hundreds of other apparatus and machines of war were studied. Carefully selected committees of our national engineering societies were organized under the leadership of the Army Ordnance Department to serve as advisors and consultants in the development of advanced designs of tanks and other motorized equipment of war. The above mentioned "Duck" and the now famous Sherman tank are just two of the many results of these efforts.

After the Preparedness Program had officially been launched and Congress had made its initial appropriation, it was necessary to create the manufacturing blueprints from which the engines of war could be built. Because the designs of the machines of production, as well as the designs of the products themselves, determine the speed and economy with which anything can be manufactured,

This is the thirteenth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

the capacity of our industrial system is dependent, to a considerable extent, upon the ability and ingenuity of American design engineers. Germany's military might was successfully mechanized because Germany, for more than 10 years preceding the war, was riding the wave of a world-wide technological revolution. This revolution was as far-reaching as the advent of the electric motor and the internal combustion engine. It was born of the profusion of inventions and discoveries since the last war. German design engineers took advantage of every one of these.

If we are to defeat our enemies and if we are to continue to play the leading role in the post-war world we must make better use of the new technology than do our enemies. The job is up to American product engineers who already have made tremendous strides in designing the intricate machinery of production and of war equipment. Much remains to be done however.

It has been said that the Germans have not developed one single item that can be classified as basically original, nor are there indications that any so-called "secret weapon" will henceforth be developed by them. Today the Nazis are completely outclassed by the tremendous manpower of engineering brains that is at the disposal of American industry. Although we were faced by the same fundamental problems of shortages in materials, manpower and time, our engineers not only solved these problems quickly and effectively, but they outstripped the enemy by the preponderant weight of talent which we were able to bring to bear upon our problems. As is evidenced by studies of the designs of captured German war equipment, our airplanes are faster, carry heavier loads, have superior protective armor and heavier armament. Our tanks, especially the Shermans, stand unmatched. Our tractor-mounted artillery excels theirs in fighting power. Our automotive vehicles are the envy of the world. Our battleships are supreme. Our signal and detection devices are frustrating all of our enemies' attempts to dominate the seas.

And as we approach the end of the conflict, the pattern of which already has been set, the forces that converted American industry from peace to war-production will again be brought into play, and the product engineer will continue to be the fulcrum. Our post-war industry will grow from his blueprint. Nor will his job be any less urgent, any less responsible, any less sweeping in its effects than were his efforts during the war-preparedness program.

Since the cessation of the manufacture of peace-time goods, many new materials and production techniques have been developed. Plastics, synthetic rubber and magnesium in the field of materials were relatively new and restricted in their uses when war came. So were powder metallurgy, induction heating, electrostatic heating, adhesives for joining metals and compressed resin-impregnated wood. The new possibilities in product design created by the electronic devices and applications developed during the war period virtually stun the imagination and the "atomic revolution" promises to change the entire pattern of manufacturing operations.

Never before has there been so much speculation about the future as there is today. Looking forward, who can doubt our limitless capacity to continue our industrial world leadership?

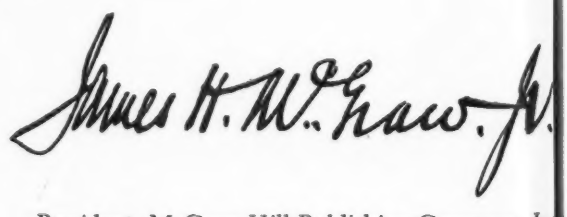
While no one can predict developments in product design in the post-war period, certain it is that they will be so vastly different and so far superior to existing designs that they will obsolete most products as we know them today. With engines of vastly superior metals, designed to burn 100 octane gasoline and built to a precision ten times greater than that of pre-war engines, our post-war automobiles will give from 40 to 60 miles to the gallon. Tires will last from forty to fifty thousand miles. The comfort and smoothness with which these cars of tomorrow will glide along are undreamed of today. Polaroid windshields will eliminate the glare of oncoming headlights and the driver will need to give but scant attention to the manipulation of his simplified gear shifts.

According to no less an authority than Igor Sikorsky, we stand on the threshold of a new air age in which the helicopter will contribute to the greatest prosperity we have ever known.

Prophecies are hard to make at a time like this but speedy house building seems to be a certainty in the world of tomorrow. Air conditioning, new methods of heating, humidifying and drying, promise to be necessities in the post-war home. Vacuum sweepers will be much lighter, less noisy and easier to manipulate. Washing-machines will be fully automatic and practically free of noise and vibration. Not only will our homes and most of the furnishings be of radically new design, but so will the factories and machines that produce them.

Only one factor can prevent the fulfillment of the dream of the product designer. His job is not accomplished overnight. To convert sound ideas into production blueprints involves a great deal of time and money. The building of test models is an expensive and tedious procedure. An abundance of seed money is required to perfect the product, to develop mass-production methods and to bring it to fruition as a finished saleable product.

It is the patriotic duty of every industrial leader to hasten these developments so that the material benefits created by them may speed our progress along the road of abundance.



President, McGraw-Hill Publishing Company, Inc.

Priority Changes

Construction pace slackens in West

CHANGES in priorities and price and other regulations during the the past 30 or so days have been in small details. The real war front—almost a civil war front—in these matters has been in the food field, not electrical. Maintenance parts for appliances, radio tubes, farm supplies, and inventories received some alterations, and there were further eliminations of critical copper from switches and other electrical fittings.

In the construction field, except for the finishing up of a variety of housing, plant expansion and major projects, the pace was noticeably slackening throughout the West. Bids for new housing and hospital units reflected this scarcity of work in sharper prices. The manpower situation did not change materially in the electrical industry, although public interest was dominated by the news of strikes and wage controversies which were exerting pressure under the various price and wage ceilings by which the administration hoped to hold down inflation.

Radio tube replacement for civilians has been so poor that there will be comfort in WPB's amended L-265 to prevent the armed services and holders of rated orders from depleting the civilian supply. Manufacturers of civilian tubes are to mark MR on their output and tubes thus marked are not to be transferred to major claimant agencies. Civilians need no rating. Their supply is to be replenished at the dealer level by certification that all MR tubes sold went for maintenance and repair of civilian sets.

Electrical appliances were brought under still further restriction by revision of L-65, allowing production for military and commercial civilian use, yet tightening control over repair parts production. No new civilian appliances are provided for; actually some further curtailment is to be expected because of further curtailment of production of repair parts for luxury appliances. Flat irons, air and water heaters were added to the list of products which may be made freely for military and war shipping use. Appliances for commercial cooking and food preparation may be resumed on a limited scale for commercial civilian use, but chiefly to supply such equipment for hospitals, war industry cafeterias and civilian operated military training schools.

Copper is to be reduced in appliance repair parts production. Cord sets are prohibited except for flat irons. Used parts are required turned in before a repair part can be furnished. Resistance wire frozen in manufacturers' inventory may not be used in making parts without authority.

Refrigeration and air conditioning, commercial and industrial, is affected by the shortage of Freon. Where merely used for comfort cooling, the present supply is all that hotels, restaurants, theaters and office buildings may have. No new deliveries may be made to them since June 5.

Farmers are given special treatment in the obtaining of a list of specific items under both priorities Regulation No. 19 and Order M-330. The list includes batteries, motor brushes, copper wire up to 75 ft. in length, fractional horsepower motors, starters, welding rod and wiring fittings. However it does not seem to provide for any heavy duty farm equipment.

Carbon brush simplification is being worked out by the carbon brush industry advisory committee with officials of WPB. Purpose is to reduce the number of types for field replacement in electrical war equipment.

Circuit breaker equipment, not of the multibreaker class, but of the small two- and three-pole, quick-make, quick-break types, were put under stricter control by L-300, June 10. It eliminates certain trip element ampere ratings, prohibits certain attachments and restricts testing. It also prescribes an AA-5 or higher.

Knife and enclosed switches were under scrutiny for a proposed limitation order following a meeting of the enclosed switch industry advisory committee and WPB. Control would be placed over safety switch, enclosed circuit breaker, panelboard, service entrance equipment and knife switch production. Reduction would be made in gage of enclosures; elimination of galvanizing of the steel and doors of a certain type on dead-front panelboards would be required.

Electric motor controllers, as amended L-250 now states, require an AA-5 for all orders, except for use on elevators, fire equipment or floating drydocks.

Armored cable is off the list again. Originally stopped by L-165 last September, in May manufacture was permitted to include types essential to war products and plants. The latter amendment is now revoked.

Synchronous condensers, steam boilers, oil circuit breakers and liquid filled transformers may no longer be ordered or manufactured without specific WPB authority under an amendment to L-177. Orders placed before June 15 are not affected.

Generators or motors incorporated into machinery no longer require a special certification, according to an amended L-221.

Electrical indicating instruments used primarily in radio and radar are to be standardized under an amendment to L-203, June 9. The order is expected to raise output 10%.

Contractors or service repair shops perhaps do not all realize that the revised CMP-5, spoken of last month, provides that when they do maintenance and repair work for customers who have an allotment symbol under CMP, they can obtain materials needed for the performance of the work to which the customer would be entitled if he did the work himself. The cost of the materials is to be treated as the expenditure of the customer in computing his limitations for new capital additions or maintenance and repair. Probably this has often been done by contractors in ignorance but now the practice is authorized.

War housing materials have been given over to the National Housing Agency by WPB to approve where the materials appear in the current lists of approved substitutes and items, or are under the same item number on the critical list.

Suppliers inventory limitation order L-63 has been eased for small wholesale and retail suppliers, June 10. The exemption limit has been raised to inventory at cost of less than $35,000. Formerly it was $20,000. It was found that the lower level placed many distributors under inventory controls without in any way contributing to an equitable distribution of supplies. Other changes are: that the state rather than the time zone determines the amount of inventory; a new definition of "direct shipments"; a restatement of the definition of "supplies"; seasonal goods are permitted a longer stock period.

An OWI release of May 27 stated that inventories of electrical wholesalers were 44% less during the first quarter of 1943 than in the comparable 1941 quarter but sales fell off only about 9% over the same period. During the first quarter of 1942 the inventories had increased 27%. The electrical wholesale distributors advisory committee volunteered to make an appraisal of the minimum production of electrical appliances necessary for the civilian economy for WPB. A 120 instead of a 90-day reserve stock of pole line hardware, wire and repair materials for the Far West was recommended for emergencies.

Marine Electrical Training Streamlined

Home study course helps to make electricians of both men and women at Moore shipyards, Oakland

H. S. Dusenbery
Instructor, Electrical Dept.
Moore Dry Deck Co.

THE supply of experienced marine electricians has long since been exhausted—yet the demand for them continues. Shipbuilders everywhere have taxed their ingenuity as to how to train men and women quickly and efficiently. To meet this perplexing situation, the electrical department of the Moore Dry Dock Co. at Oakland has devised a novel training program to train inexperienced help to make competent electrical workers.

Faced with this problem, a group of electrical foremen got together and outlined the basic knowledge which they believed requisite to satisfactory workmanship. The training department, with the aid of technically trained men, prepared this material and mimeographed it for the use of the electrical trainees. The result is a 227-page *Home Study Course in Marine Electricity*. The name of the course arises from the fact that it has been designed for use at home after working hours. With department heads frankly skeptical of this method at the start, the program proved to be an instant success once it was established.

The course is divided into 24 separate chapters. One chapter is taken home each week by the trainees in the electrical department from the date they obtain their rate. Trainees receive a 10c per hour increase over the helper's rate. Every 60 days they receive an additional 5c per hour increase, until at the end of six months they obtain the full journeyman's rate of pay. These pay increases are given with the understanding that the trainee put in four hours per week of study on his own time.

Every electrician trainee goes through the first 19 chapters. They are elementary and deal with fundamentals of the electrician's job, the nomenclature of the ship, and the principles of cable installation. Beginning with chapter 20 there are four fields of specialization, any one of which the trainee may choose, depending on the type of work he is doing. The four sections include interior communications, power, lighting, and maintenance.

At the end of each chapter is a question sheet to be filled out and answered by the trainee. These sheets are read and carefully graded by appointed electrical department instructors. The grades are regularly posted on a large bulletin board so that the trainees can see the results of their efforts. Should a trainee require further information regarding any phase of the material he is studying, he may consult the electrical instructor in the training department and receive individual coaching. At the conclusion of the course and just prior to obtaining the journeyman's rate, the trainee is given a written examination covering the salient facts presented in the course. At present there are approximately 1,000 trainee electricians taking this course at the Moore Dry Dock Co.

The key man in this type of training program is the job instructor who works with the trainees on the job. A job instructor is a specially qualified journeyman who is given a 6c-an-hour raise above the journeyman's rate as a premium for instructing. Before becoming a job instructor, the journeyman receives a short course covering the basic principles of how to teach.

Each job instructor has approximately 10 trainees under his wing. He translates the facts gained from the home study course into their practical application on the job. At the end of each week the job instructor turns in a report on the progress of his trainees. This report is compared with the trainee's grades on the home study course. Through this program the foreman and other supervisors know which of their crew is making the most progress. The few who do not respond to the training may be transferred to more suitable jobs.

The job instructor shows the trainee *how* while the home study course teaches *why*. This combination of how and why has proved so successful that many other crafts at Moore are using it as a model for their own instruction program.

The table of contents of the *Home Study Course in Marine Electricity* includes the following chapters:

1—The home study course.
Details on the operation and function of the course—the purposes and objectives of the training program.

2—The ship.
An outline of the principal ship terms likely to be of use to an electrician and a description of the duties of other shipyard trades such as the machinist, welder, driller, flanger, etc.

3—The electrician's job.
A general outline of the type of work done by marine electricians. Includes a simple explanation of the turbo-electric and diesel electric drives, etc.

4—Cable.
The construction and uses of the various types of cable used in marine installations.

5—Cable.
An explanation of the care, cutting, serving and handling of marine electric cable.

6—Cable supports.
Explanation and diagrams of the various methods of racking cable—showing the use of collars, saddles, etc.

7—Water tight tubing.
The methods of passing cable through water-tight bulkheads and decks. Includes the use and construction of bulkhead tubes, terminal tubes and kick-pipes.

8—Elementary layout.
Description of the methods used to lay out elementary cable runs.

9 and 10—Ohm's law.
The basic principles of series and parallel electrical circuits, including the measurement of volts, amperes, and ohms.

11—Electric power.
An explanation of the unit of electrical power (the watt), including definitions of the terms force, work and power.

12—Magnetism.
The basic principles of magnetism with emphasis on electro-magnets with view to their application in generators and motors.

13 and 14—The electric generator.
An elementary description of the operation of a simple generator including the terms field coil, rotor, stator, commutator, etc.

15 and 16—The electric motor.
A description of the operation of a simple motor giving the magnetic and electrical principles.

17, 18 and 19—Testing
These chapters describe the main tests carried out on electrical equipment of a ship before it goes out to sea. It emphasizes to the trainee the necessity of doing careful and painstaking work.

20 to 24—Interior communications.
Typical problems faced in laying out IC circuits. A description of the various IC and navigation instruments. Chapter deals solely with blueprint reading.

20 to 24—Power.
Advanced cable layout, hooking up distribution panels, the principal deck power and engine room power circuits. Finally, a chapter on blueprint reading.

20 to 24—Marine lighting.
Advanced cable layout, hooking up lighting distribution panels and the principal lighting circuits including emergency lights. Again chapter 24 covers blueprint reading.

20 to 24—Maintenance.
Includes material on power equipment maintenance in the shipyard, the upkeep of d-c and a-c machinery, the maintenance of controls, relays, temporary lights, and maintenance of arc welding machines.

So successful has been the course and so great has been the interest shown by the workers that the writer has been encouraged to prepare a more detailed and advanced course in ma-

rine electricity. This advanced course will be available to journeymen electrical workers when it is ready.

The training program at Moore is typical of the effort American industrial plants are making in the training of their workers. Vocational education experts predict that industry will relieve public education of a great deal of the burden of industrial training now that the war has shown that industry competently can train its own personnel. In the past if a man did not succeed on a job he was removed and another hired in his place. Today men with experience in marine electricity are unobtainable. As a result the company has had to train its own and is highly pleased with the results.

Infrared Testing

WILL it work? Just what application can be made of infrared heat in all manner of industries is a matter of much cut and try. To assist war industries to try before they buy, the Leo J. Meyberg Co. has established two testing laboratories for Fostoria infrared equipment at its Los Angeles and San Francisco headquarters. That in Los Angeles is on a larger scale and is the particular development of Walter Stickel who has charge of that department of the organization.

The Los Angeles laboratory has ample floor space on the second floor of the warehouse. It is equipped with a paint spray booth, a conveyor and several portable sections of infrared reflector, which can be arranged at will to make tunnels, banks, or other arrangements for experimenting on samples brought there for trial.

A Thermador range oven, equipped with thermostats, is also set up for testing of behavior of paints, varnishes and pigments under a variety of temperatures.

Some of the unknowns tested in this manner were yarn skeins which had previously required a day to dry in the air. Infrared dried the dyes and removed moisture in 30 minutes. Canvas dipped in paint for army use required only two minutes exposure, it was found, not to smudge when pieces were stacked together.

Reclaimed rivets, washed and cleaned, were dried in five minutes while it took over ten with other methods. Cement molds for casting of certain materials take long to dehydrate. Experiments are being conducted to see whether infrared will solve this particular difficulty.

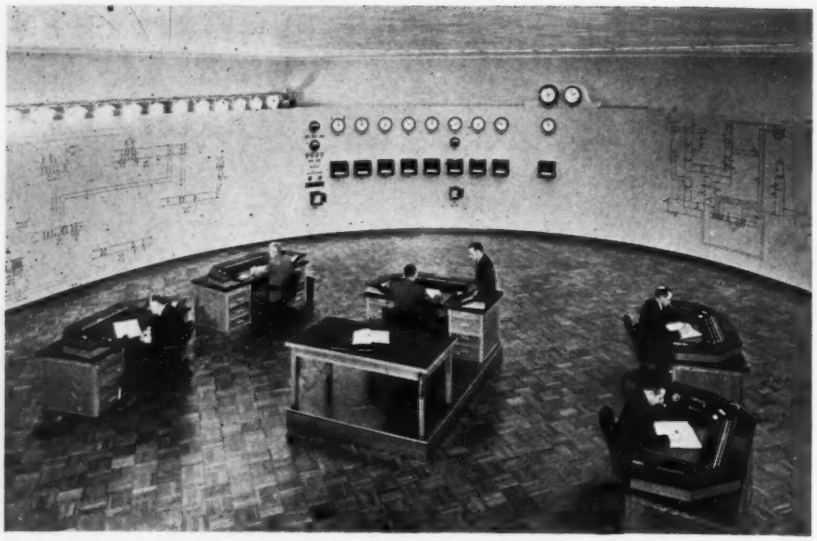
Stickel insists that the laboratory is not for selling equipment but genuinely for testing the adaptability of infrared to particular products where the results are unpredictable from previous experience. A display of various types of equipment, as well as local lighting equipment, is maintained at this point, however. Sales of the product are handled by Quality Electric Co. for permanently installed jobs, California Wholesale, Graham Reynolds and Machinist Tool & Supply Co.

Contractor Upheld

The case brought by the Contractors' State License Board versus Norman Russell, electrical contractor of Santa Rosa, reached the State Supreme Court of California. The case grew out of charges brought against the contractor for alleged failure to follow the plans and specifications in an installation at the Napa Union High School. In a hearing before the Registrar of Contractors Russell's state license was suspended for a year. Attorneys for Russell brought the case before Superior Judge Frank Deasy, San Francisco. On a technicality as to admission of evidence, the court entered a judgment granting a writ of mandate compelling the registrar to restore Russell's license. An appeal was taken to the District Court of Appeals where the Superior Court was reversed. Russell then petitioned the Supreme Court for a hearing which affirmed the judgment of the Superior Court. The justices were divided four to three. The charges grew out of a survey of the installation at the Napa Union High school by G. M. Simonson, consulting engineer on behalf of the district attorney of Napa County.

A turntable for displaying lighting fixtures has proved its worth at the Pocatello (Idaho) Electric Supply Co., according to E. W. Hale, contractor-dealer and proprietor of store. The device is so wired that, as the turning rack passes a row of contacts, fixtures in front of customer are lighted and the others left dark. One of its main advantages is space conservation, since it permits display of a variety of bracket and wall type fixtures without cluttering up an entire wall. Another advantage is customer looks at only a few fixtures at a time; avoids confusion

Paint drying samples are tested in Leo J. Meyberg laboratory at Los Angeles



General Illumination

An average of 25 f-c of totally indirect lighting is provided by long banks of floodlights, mounted on two facing walls behind the diagram board and just high enough to project light on the ceiling opposite. Board shields direct light from eyes. Each bank contains 24 500-watt S & M floodlights, with specular Alzak reflectors, equipped with inside frost lamps to project a fairly narrow beam. Twenty-four Pittsburgh window reflectors, with 150-watt lamps, are mounted between the floods to illuminate the area between wall and the line where the upper part of the flood meets the ceiling.

Equipment is enclosed in a heat-resisting glass channel, Pittsburgh "Herculite" ¼ in. glass, ventilated by an exhaust fan. The warmed exhaust air may be used for room heating when circulated by the air conditioning system.

LIGHT for LOAD DISPATCHING

Who

Los Angeles Bureau of Power & Light. Installed under direction of Lloyd A. Gates, illuminating engineer.

The Need

Illumination in a modern windowless structure, where load dispatchers must work with speed and accuracy on eight-hour shifts. Requirements were easy observation from dispatching desks of a large horseshoe-shaped control board.

Conditions

Main board room is 40 x 60 ft. with a 15-ft. ceiling; control board, 10 ft. 6 in. high. Ceiling is off-white; face of board matt, light grey-green finish, with contrasting diagram.

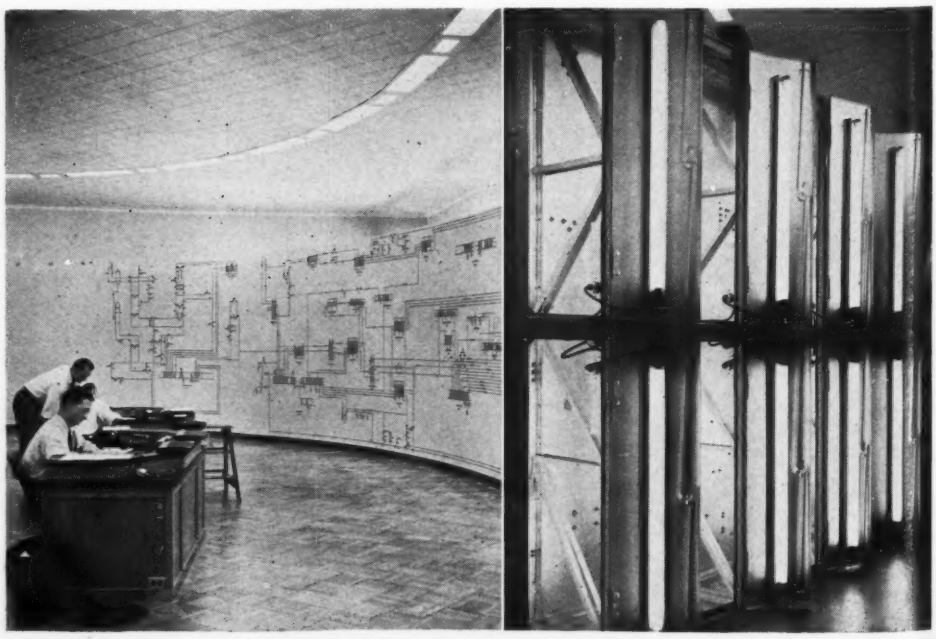
Results

Brightness distribution without abrupt variation and ideal for eye comfort and energy conservation. Ceiling is clear of glass and lighting equipment is concentrated so that heat load may be controlled.

Board Illumination

About 12 f-c of vertical illumination provided by general lighting are supplemented by 9 f-c from Holophane optical units, installed flush with ceiling and 52 in. in front of the board. Groups of four- and two-lens units are alternated in an almost continuous line. The former are equipped with 100-watt lamps, wired for 300 watts and connected to the regular house circuit; alternate lamps are controlled by one switch at the panel board. Two-lens units, equipped with 100-watt lamps, are fed normally from house circuit, but can be connected to the emergency a-c gas-engine-driven generator.

On some sections of the board, switches are indicated by interchangeable colored translucent plugs, illuminated by 3500° white fluorescent lamps in cells behind the board.



Sales Group Optimistic

Northwest utilization men face war realities courageously; methods of meeting them differ

IT was no discouraged group of ex-salesmen, gathered for a post mortem, that met as the Utilization Section conference of the Northwest Electric Light & Power Assn., at Portland, June 11-12, under the chairmanship of J. C. Plankinton, Northwestern Electric Co. As Plankinton declared at the close of the day and a half of realistic, constructive, analytical discussion, optimism was the predominant feature of all the viewpoints expressed. Ideas were freely exchanged, methods compared, viewpoints subjected to the cross fire of discussion and sometimes kidding, but gloom was nowhere apparent and courageous facing of the war's realities and the future's uncertainties was unanimous.

In the details of handling similar matters, however, there was not much unanimity. The individuality of the companies, the men directing the utilization or commercial end of the business, and the differences in regional conditions made the talk stimulating and the ideas varied. Seven general topics filled the day-and-a-half of intensive sessions. By appointment of a discussion leader for each topic, each of whom called on representatives from various companies for their own methods or ideas, the program proved lively and held to time limits exceptionally well. Attendance was limited to from one to three from each company with scattered attendance of manufacturers and distributors.

Discussion leaders and their topics were: *Functions of Sales or Utilization Departments*, by A. H. Wegner, Washington Water Power Co.; *Dealer Situation*, by D. B. Leonard, Pacific Power & Light Co.; *Customers Service—Appliance Servicing*, by J. M. McKay, Portland General Electric Co.; *Impending Brownout Order*, by R. B. McElroy, Washington Water Power Co.; *Securing War Contracts for Customers*, by R. E. Gale, Idaho Power Co.; *Utility Employees in Civilian War Work*, by J. B. Buman, Northwestern Electric Co. and *Postwar Planning*, by C. E. Hess, Puget Sound Power & Light Co.

Dealer Situation

Dealer mortality, Leonard said in opening with that topic, has been general. The question asked is whether dealers will be available when manufacturers resume appliance making; then utilities may need to assist manufacturers to get dealers. Mortality on the PP&L system has been 25% on small and 32% on major appliance outlets. Survivors have proved ingenious in the variety of substitute lines now carried, Leonard said.

In British Columbia, after two more years of war than here, Ed Walker, sales manager, B. C. Electric, said only 33 dealers now report whereas 100 did before. Canadian restrictions prohibit the sale of an electric range to any house equipped with a chimney. Dave Salsbury, Westinghouse Supply, thought that from 50 to 75% of dealers may go out before the war is over but felt a large majority would re-enter when peace came.

Ralph Gale, Idaho Power, expressed the opinion that it would depend upon how intensely managements desired load building after the war as to whether utilities would remain out of merchandising. If managements want to recapture industrial load as it is dropped, the question is whether a dealer organization can move that fast and the utility may have to fill in the gap.

He illustrated with figures of revenue drops in farm accounts despite high crop prices when his company ceased aggressive merchandising in farm areas. On the other hand, domestic revenues from cities near dealer stores showed increases. The dealer, he said, often would not drive out 20 or 30 miles in the country to sell ranges. During the period between 1936 and 1942 when most of the merchandise in the territory was sold by dealers, it had not been sold where the company needed the greatest development.

Harold Farris, Mountain States, concurred that most dealers would go back into business because they had really made money during the last few years and were anxious to resume. R. C. Brummer, of EH&FA, substantiated this by telling of the success of financing for dealers. With money from private banks he said his organization had handled 41,000 contracts, 91% of which were for private companies and had actually turned a profit back to the government. He said dealers could be reminded of the money they made.

Plankinton Snow Johnson Hess

Charles Hess, PSP&L, said that many of the best salesmen of the utilities planned to go into business for themselves. Department stores would all resume appliance selling. R. B. McElroy, WWP, declared it to be basic that it took good merchandisers to sell goods and since money had been made in appliances the good merchants would re-enter the business. The utility's job, he said, would be to create the demand for equipment. That sort of assistance dealers would appreciate. In sparse territory it might be necessary for a utility to sell, even as it is to do service work now if there is no dealer to do it. For the first two years, he felt, there would not be enough merchandise available to sell.

A. C. McMicken, PGE, who admitted not being sold that dealers could do the entire job in 1938, said he marveled at the results his company had obtained from dealers by giving them promotional help. In 1941 dealers had sold 9,000 ranges. Fred Hodge, sales manager for the divisions of the same company felt that the real difficulty after war might be the inability of lightly built old line extensions to carry new loads sold and that managements might be reluctant to rebuild the lines. With franchise commitments wiped out by war, he said, manufacturers would be able to select more aggressive dealers and the natural covetousness of the public would bring them from the country to dealer stores in towns to buy new and modern appliances. In concluding this session, Plankinton commented on the change in prospect since the last meeting. At first it had been feared that the war would kill off all of the industry's distributing machinery, but it had survived because it could better serve the public, even in war.

What Salesmen Do Today

To give all a cross section of the type of sales organization that remains in the various utilities after a year and

Volheye

a half of war before analyzing what utilization responsibilities they now carry, A. H. Wegner, WWP, asked representatives from each company for the data contained in the accompanying chart. He then called upon each company to tell what tasks had been assigned to these decimated sales staffs. In his own company's case, he said, the entire sales organization had been cut from 102 to 34, its residential staff from 73 to 17, commercial from 18 to 7, leaving one person per 4,500 customers instead of to 1,000 previously.

The work they do is either that more or less demanded by customers, such as adjustment of bills or of other difficulties, or that directed by the company. In the latter group are delivery of extraordinary bills needing explanation to eliminate complaints, negotiations with customers to permit meter readings where old meters are located inside, and reclassification of accounts. Wegner advocated maintaining a record of all calls, not only to keep track of manpower but to assist in preparation of occupational 42B forms.

J. M. McKay, PGE, explained that his company's home economist gave customer service by phone calls during mornings, and in the afternoon made the few mandatory calls which street car and walking could reach. Plankinton said that Northwestern's home service girl initiated some calls in new housing projects. He spoke of an interesting survey conducted in such projects to ascertain from where the people came and their previous experience with electric cooking. Surprisingly the majority came from nearby towns in Washington and Oregon. Studies of load use, too, have been made in such projects where no restraint has been put on use of electricity paid for in the total rent. The use averages around 400 kwh. per month. Because of three-shift working, the load is quite evenly distributed around the clock.

By contrast Puget Sound Power & Light has converted its entire staff to utilization work of important character and has been able to maintain it with management enthusiasm and against draft losses. According to Hess, the home service staff of girls numbers 10 and will be increased to 12. They carry on an essential program of nutritional and service education. The industrial service consultants render valuable engineering service to government and war production agencies, assist in dimout compliance, have actually helped reduce accidents in the dimout areas. Farm service consultants never were busier than now assisting farmers to exchange and obtain and improvise equipment.

Both Farris of Mountain States and L. C. McClurkin, president, West Coast Power, explained that the service men, operating men, and district office managers handle such activities for them and hence there are no full-time sales employees.

Pat Johnson, PSP&L, amplified on his company's philosophy. Cuts were made in the sales staff in 1941 and none since because those remaining were all doing work which the operating departments would otherwise have to do, without the better-trained diplomatic sales approach. Sales departments, he declared, have always done more application work than mere selling. Justification of the policy has been found in draft deferments. Except for five or six from the staff who obtained commissions, no others have been taken by the draft.

McElroy emphasized that managements often were derived from operating or legal backgrounds and could not visualize a sales department without pots and pans to sell, but that any function or problem of the company that needed to be sold, any idea that involved customer relations, could best be handled by the sales department.

Should the Brownout Come

The experience of companies in the dimout zone was asked by those from inland territories should the forecasted national "brownout" of lighting be ordered from Washington. McElroy led this discussion by posing questions as to what effect such an order would have in locations deriving their power from hydro and having no fuel shortage—would the blame be placed on utilities, would they be expected to do the enforcing, how could they do so with present reduced manpower and finally what effect on revenues would such an order have? Necessity for the dimout was more obvious to the public in coast cities or regions.

Opinions were almost unanimous that, with the proper type of publicity, the public would understand, that it was already prepared by other restrictions and rationing. McMicken cited the understanding way people took turndowns of their requests for line extensions, range wiring and similar denials. Pat Johnson declared that if the job was handled by men accustomed to customer relations it would be accepted gracefully. Harvey Leach, publicity director of PSP&L, urged no overdoing of explanations, that "he who apologizes is very apt to accuse himself."

Cost in lost revenue from a brownout was estimated variously at from three to five per cent of commercial business. Dimout experience had been that such revenues dropped but in many cases because of new war loads, had been lifted up again. Leonard of PP&L, which serves interior and non-war production territory, declared that commercial revenues were already down materially.

In summary McElroy advised that in order to retain a selling attitude throughout and keep alive the appreciation of electrical benefits, all activities to inform the public be based on the following premises:

That customers are asked to sacrifice temporarily the benefits of utility service.

That such sacrifices are necessary to help the Victory program.

That the company in asking them to curtail is also making a serious sacrifice.

That full information be given and dis-

SALES OR UTILIZATION PERSONNEL

Company	Total Customers	General Office	Residential and Farm	Commercial Industrial	Total on Staff
Washington W. P. Co.	85,000	10	17	7	34
Pacific P. & Lt. Co.	70,000	8	1	1	10
Portland G. E. Co.	149,000	8	4	10	22
Northwestern	52,000	5	2	3	10
Puget Sound	227,000	10	80	20	110
Idaho Power	72,000	10	16	5	31
British Columbia Electric	117,000	17	13	7	37
Eastern Oregon	8,000	1	1	..	2
Mountain States	65,000	2	..*	..*	2
West Coast	23,000	..*	..*	..*	..*

Includes managers, salesmen, stenographers and clerks, and home service.
* Joint responsibility of operations and utilization on managers.

tributed widely to all customers affected directly or indirectly.

That all sales activities include suggestions as to how customers can cooperate in curtailing use of service with minimum inconvenience to the customer.

That customers be informed as to the large amount of load required for war production.

Berkeley Snow, executive secretary of NWEL&P Assn., read correspondence from Edison Electric Institute cautioned that WPB frowned on advertising by utilities that could in any sense be construed as promotional, and instead urged that copy stress the idea, "Waste in war is a crime. Do not waste electricity just because it is not rationed." The criticism of utility advertising was that it did not talk conservation, and it was felt that even mention of low rates or inference of abundant supply of power might be construed as promotional.

Customer and Appliance Service

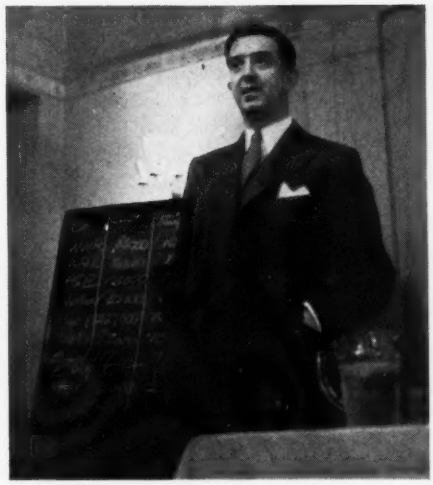
J. M. McKay, PGE, summarized most of the various aspects of the servicing situation in reciting his own company's experience. Of recent years servicing had more and more been diverted to dealers by raising prices for service to a level at which dealers could do it and make a reasonable profit. However, appliance service seems to have been specialized in by a few dealers or service stations and not by all dealers. The main trouble is that which affects all other areas—shortage of experienced help to do the repair work. Some thought has been given to training classes but shipyard competition makes the obtaining of students difficult. The most serious problem is in connection with the sealed-in type of electric refrigerator where motor rewinds are necessary.

Ceiling prices set by OPA on used refrigerators and washers, McKay contended, were keeping many from being reconditioned and made available to the public. The cost of reconditioning was more than the ceiling price.

Edmund Walker, B. C. Electric, told of Canadian practice. The utility still does about 50% of the appliance repair. Parts are becoming a problem. Salesmen and warehousemen have been trained to do repair work. Service calls, except of emergency nature, are not promised in less than 48 hours.

Manpower and parts are the two shortages in Idaho, said Gale. Parts for appliances of which only a few were sold are the real problem. With a 65% range and 35% water heater saturation the company is still endeavoring to give rapid service.

George Boring, General Electric Supply Corp., Portland, presented a letter from the Pacific Coast Electrical Assn. urging passage of substandard appliance control ordinances to prevent a flood of postwar cheap appliances which would do the industry harm and load the utilities with service trouble. He asked W. R. Volheye, Oregon's state electrical inspector, to tell of the experience with the Oregon law on the subject. Volheye explained that, rather than try to police the law in such a widespread area, his policy had been to sell the dealers throughout the state on the desirability of compliance and the freedom from responsibility it would bring for any accidents which might come from inferior and unsafe cords or appliances.



Bragg

At Boring's suggestion a motion was passed urging the executive committee to urge the passage of such ordinances in all cities and to make them part of state law where possible.

McKay told that in a housing project supplied cheap hotplates the rate of burnouts was 40 per day. W. A. Cyr of ELECTRICAL WEST told of the PCEA survey of availability of repair parts and of the water heater tank situation as it had been discussed at that association's conference the week previously.

A. F. Douglas, Lang Manufacturing Co., urged that accurate information as to serial number, voltage and amperage of replacement parts for commercial equipment be furnished the manufacturer in ordering, to expedite delivery. Worn parts are to be turned in, he said, and told that customers whose ranges are beyond repair may be entitled to buy new ranges by proper application with full information to WPB.

President of the association, George T. Bragg, vice-president and general manager of Pacific Power & Light Co., addressed the conference briefly, saying that the manpower situation would be much more serious soon. Draft quotas will reach deeper and it may be necessary to train more women for service work. Although the war may last long, he said, it is wise to think of the future and to do some planning. He said he believed the utilization departments would have a great responsibility to take care of the changes in business after the war. Speaking of the servicing problem he declared it a joint problem of manufacturer and utility and, as for regulation of substandard appliances, felt that the association could back up such legislation even if it could not take aggressive action to secure such laws.

Securing War Contracts

With executive finesse Ralph Gale turned over to Orland Mayer of Idaho Power the job of telling what his company does to help local industries secure war subcontracts. Mayer executed in rapid fire fashion to say that in a territory removed from heavy war production the job of getting subcontract work for local small industries required creation of interest in the industrial customer, the government agencies involved, the larger industries holding prime contracts and even the subcontracting smaller industries. Help to their customers includes that in making bids, reading blueprints and specifications, guidance in priority applications, securing of equipment (an Equipment Bulletin was issued by Idaho Power to facilitate exchange and purchase), engineering assistance in construction and buildings, job analysis.

Pools are formed and lists of WPB bids studied and local industrialists called and told of them, helped with them. Formation of pools requires extensive information to appraise assets and capabilities, make presentation reports. Mayer stressed the promise inherent in the new Smaller War Plants division, a child of Congress and not presidential directive, which is set up to aid any kind of small business. Utility assistance is further given in the training of employees to do the new work through the Training Within Industry program.

In all, the utility can secure such contracts for its customers by (1) arousing the interest of all concerned, (2) finding out what is in demand, (3) organizing the industry or pool to make it, (4) helping with production difficulties and (5) going after repeat orders.

By assigning one man, Ladner Ross, to this job for his company, R. B. McElroy said, and the fact that this man lives with it, keeping informed on all phases, "taking a beating" because of its slowness and discouragements, after six months the program is panning out for Washington Water Power. He read a short summary of the activity prepared by Ross giving reasons for

the program, the nature of activities and results attained.

Reasons for it—"outmigration of workers to war industries . . . concerns close doors, employees move out of town. Revenue is lost from the concern, from employees' homes, from stores from which the employees bought. On the other hand, when able to assist customers to convert to war production, then this outflow and revenue loss slows up and in some cases workers come back home to live." Activities take the form of imparting information, interpreting specifications, locating materials and prices, helping prepare bids, finding financial backing. "Perhaps one of the most important is to try to keep the customer in a hopeful frame of mind so that he won't give up the sponge while waiting."

Accomplishments, he said, were small in 1942 and customers skeptical. Now results are piling up. To date a significant part has been played in obtaining contracts for over a million dollars for local small plants with employees ranging in number from 10 to 60.

Being 200 miles away from the nearest WPB, Leonard said that efforts in Pacific Power & Light territory were on the outer fringe and the time lag between advertising for and placing of bids was against them. With a curtailed utilization force calls had been made on shipyards, their subcontractors ascertained, and then subcontracts from these subcontractors obtained. They have sold the facilities of these local small concerns to the subcontractors.

Mayer concluded with the information that WPB can give a subsidy to local industries equal to freight.

Civilian War Work

What part utility employees play in civilian war work and on committees, drives, bond campaigns, blood banks, and all other similar activities was discussed extensively on the Saturday morning session under the leadership of J. B. Buman, Northwestern Electric. He read from reports received to his queries to various utilities and commented on various phases of the work. Particularly he urged more donations to the blood banks.

In discussing the methods used to handle employee purchases of War Bonds through pay roll deductions, he stressed the psychological necessity of talking of them as purchases, not deductions. Walker described the organization for the war loan drives in Canada and told how improved results had been obtained when union leaders were put on the committees and given the responsibility of getting their membership to purchase the war bonds.

McElroy declared that the selling of bonds should not be approached apologetically at all, that when the job is turned over to the sales department a real sales approach can be given to the job that makes the purchase of bonds highly desirable from the standpoint of an investment. In his company employees exceed the 10% quota and have been sold the idea of systematic savings. "I think it is a mistake to allow it to be considered on a sacrifice basis at all," he said. Department heads had talked over with each of their own employees their individual ability to buy the bonds and to make personal adjustments to their budgets.

McMicken Wegner

Postwar Planning

Appropriately the war conference ended on the note of forward planning which led Chairman Plankinton to compliment the group on the optimism shown. Charles Hess, PSP&L, had charge of this part of the program. While he urged no let-up on war activity, he said that any wise management needs to plan ahead. Too many, he said, are not doing any planning and many think the temporary war prosperity will continue. He then swept quickly over some of the things the industry may look forward to and should plan for.

Difficulty in getting dealers will not be great, he predicted. Electrical contractors will not be active in merchandising. In electrical appliances there should be water heater standardization. Instead of washing machines, laundry machines more fully automatic, may be expected. The automatic dryer and the ironer will come into prominence.

Dealer cooperation will require the resurrection of educational classes in salesmanship itself, not equipment features. Service training schools may be needed to divert the servicing of appliances away from utilities. Advertising and promotional material, newspaper, radio and window display will be required. More floor demonstrations by home service women of the utilities for dealer stores should be considered and home calls resumed for new range and other appliance users.

Home lighting, Hess feels, will have to start over from scratch because of the inhibition of lighting by dimout and super conservation. Outdoor and garden lighting, too, will need to begin all over again for it has been ruled out for the duration. New styles in lighting and fluorescent in the home can be expected. Work with local manufacturers to help them build the proper type of equipment will be important. Perhaps the lighting job will have to be separated from home service. Certainly the home service women will have a dual job, that of maintaining the fine acceptance of their work achieved by their unselfish contribution to war nutrition and conservation, and also the job of fostering new appliance uses when merchandise is again available.

The hordes of people who have moved into the areas may be expected to try to stay there. Many have bought small farms and farm electrification assistance will be necessary to these people. The mechanic who has tools to make up his own home equipment should be directed to make safe and satisfactory equipment. Established farmers will require much new and better equipment.

Industrial lighting, given such stimulus by the war production factory lighting, will be demanded. Utilities and contractors will need to work together to develop this kind of lighting. Street lighting has been arrested by war. A great development in this field is to be planned for. Power uses will require extensive reconversion from war production to peacetime products. More commercial building may be expected. Electric space heating, panel heating may come. Commercial cooking should be greatly enhanced by the experience of Army and Navy cooks with all-electric equipment.

"The desire to buy on the part of everyone has grown to immense proportions because of the inability to buy anything during these years," concluded Hess. He next called on two manufacturer's representatives for comments.

Joe Platt, Hotpoint representative, described some of his company's planning, and told the purpose of the questionnaire now being circulated to utilities to get their opinions for guidance to the planning for the future. First production after war is over, he said, must be of models stopped by the war and that the new dream models will be a year or more coming on the

market because of retooling and testing necessary.

R. G. Hutchison, Frigidaire's Pacific Coast manager, told of his company's war production and predicted that it would take several months to get into appliance production because of the moving of many essential machines. Constant surveys will be made by his company, he said, to keep abreast of the thinking in terms of the future but no promises of any kind can be made until the job of the war is definitely done.

At the close of the meeting the nominations for vice-chairman of the section were called for. These nominations are given to the executive committee of the association as recommendations from the section. Since C. E. Hess is vice-chairman now it is expected that he will become the next chairman. A. C. McMicken nominated A. H. Wegner, Washington Water Power Co. Spokane division sales manager, for the next vice-chairman and the conference approved that choice.

Attendance at the conference was much better than that at the previous one last fall, a total of 55 in all.

Appliance School

Northern California electric appliance service dealers and their service personnel have been going to school again, attending a series of three-day service meetings sponsored by the Electric Appliance Division, Westinghouse Electric & Manufacturing Co., with the active cooperation and assistance of the Pacific Gas and Electric Co.

Meetings were conducted in recent weeks at Reno, Stockton, Santa Rosa, Sacramento, Chico, San Jose and Oakland. The three-day sessions, called "Conservice Training Schools" because conservation and service were accented, were conducted by C. E. Watts, Pacific Coast service manager for the Westinghouse Electric Appliance Division, and R. J. Stamphar, San Francisco service manager for the Westinghouse Electric Supply Co.

Aim of the dealer schools is to do three jobs: give the beginner basic information about the various products, present "how to fix" information on things he can fix, and tell how to replace parts which he cannot fix. The sessions also comprised brush-up courses for experienced personnel, giving suggestions on short cuts in repair work and on conservation of renewal parts. Sessions each day lasted eight hours.

In each school, the first day's session was devoted to the fundamentals of electricity and its use in heating appliances and motors. The refrigeration cycle was explained, methods of house wiring were considered, various practical projects were undertaken and actual service demonstrations were given. Servicing of table appliances and laundry equipment was considered fully.

Second day's session concerned the servicing of electric refrigerators. Electric ranges and electric water heaters were considered during the third day's meeting.

Service Directory

Working to capacity and with little office help, many small appliance repair shops are finding it difficult to secure latest information on sources of parts and services. To help overcome this obstacle, Pacific Power & Light Co. has issued a Service Station Directory. Listing manufacturers and distributors of repair parts as well as independent service stations, the booklet has been distributed to all electric service and repair shops in the company's territory.

Data was compiled by Guy E. Davis, domestic sales supervisor, who also solicited the cooperation of wholesalers in shipping parts to small operators. Suggestions from distributors to facilitate handling of parts or appliances are incorporated in the directory.

Pocket Guides

A set of five pocket-size service guides has been made available by Hotpoint for distribution without charge to retail outlets and repair men who service Hotpoint major appliances. With covers of different colors for easy identification, a separate book is devoted to the electric range, refrigerator, home laundry, kitchen sanitation equipment and water heater.

Designed to help both the seasoned service man and the novice, the books highlight service procedures, give quick information for finding and correcting trouble. Points are illustrated by photographs and diagrams, including cut-away sections.

● Greasy Overalls and work uniforms, according to an article in a recent *McCall's* magazine, can be washed with the aid of a washing machine and napthalene moth flakes. Directions are given for washing various types of greasy garments in both the wringer-type and automatic washing machines. The method is new and timely and should be made the most of by home service advisers and in advertising.

Wartime Service Card

"Wartime Service for Our Industrial Consumers" says the card now used by members of the Business Agents Division making calls on industrial customers. "It is surprising how well this idea is received and how much more welcome our representatives seem to be since we used this card," said Charles Snyder, business agent.

The card is a fold-type card, inside of which are listed some of the services that can be performed by the utility's staff. Each classification of service is grouped together with the telephone number and station number and room number of the staff available for that particular service. No names are carried on the card.

Text of the card is as follows:

We Can Help You with the Following War Production Problems

1. Locate firms having machine tool time for specific work
2. Locate additional work for your men and machines
3. Locate additional factory floor space with adequate power facilities
4. Cooperate with your realtor in locating factory sites or industrial property

●

1. Solve production, office, and protective lighting problems
2. Solve dimout and blackout problems

●

1. Frequency and motor problems
2. Circuit loading and power factor analysis

●

1. Industrial electric heating and air conditioning applications
2. Heat treating of metals
3. Enamel drying
4. Infrared applications
5. Miscellaneous heating problems

●

1. Electric cooking and baking equipment for employee cafeterias
2. Electric mobile food cars.

● Electric Vacuum Cleaner Co., Inc., Cleveland, Ohio, manufactures the following cleaners: Premier, Premier Duplex, General Electric, Magic Aire, Frantz Premier, Premier Junior, Spic Span, Vac Kit, Pic Up, Grand, Franklin, Gainaday, Cleveland, A.M. C., Check Seal, Cinderella, Sloane, Hot Point, Liberty, Hoosier, Wardway and Thor. Parts and repairs are handled in San Francisco by the company's offices in the Chronicle Bldg. Starks Vacuum Cleaner Service is the Portland service headquarters for Premier-Duplex.

● Saviers of Reno was the only electric refrigerator advertiser recently, when it offered some Seeger commercial type, two-door, large refrigerators for sale to ranches, mines, contractor commissary and small restaurant customers.

Wartime Conferences Meaty

PCEA members study material and manpower limitations at dual sessions in north and south

MATERIALS and manpower held the spotlight at all sessions of the two-day conferences held by the Pacific Coast Electrical Assn. in Los Angeles June 2 and in San Francisco June 9. Since shortages of these two essentials are plaguing all departments alike, group discussion was down-to-earth study of how to get along with available supplies. To permit free exchange of ideas and experience, the majority of sessions were of the conference type.

Postwar operation came in for consideration at a luncheon meeting, when R. E. Fisher, chairman of the planning committee, told the aims of this fact-finding organization. Functioning as a catalyst and stimulant to united action, the committee will gather material and submit ideas, Fisher said, then it is up to the industry to do the job. He counseled that planning be kept flexible and pliable so that the industry may have a new view for a new opportunity. True grass root planners, the committee intends to "make haste slowly", he declared. Some of the research underway has to do with simplification, conversion of plant, financing, markets and buying power, distribution methods.

Frank C. Angle, Pacific region manager, Allis-Chalmers Mfg. Co., San Francisco, was elected president to succeed S. E. Gates, Los Angeles district manager, General Electric Co.

Business Development

LOOKING forward to a V-day "when the lights go on again," and still keeping an eye on the most pressing questions of the day—repair parts and service manpower—the Business Development Section at both conferences followed the same outlines under the same discussion leadership and argued the questions in much the same way. It was pertinent, revealing and heartening discussion, all of it, and left a feeling of assurance in its wake among the large attendance of utility, manufacturer and distributor people attending.

Frank Angle, Allis-Chalmers, section chairman, left a new potentiality to think about when he predicted that the war might deplete the oil and gas reserves to such an extent that much of the industrial heat of the future might become electric, with a stimulus to manufacturers to improve the thermal efficiency of such machines as cement kilns for electric operation. He also commended salesmen as the emissaries who bring the fruits of science and invention to the people.

P. P. Pine, San Diego G & E, section vice-chairman, presided over the Los Angeles conference meetings, Angle those in San Francisco.

Are Parts Available?

Whether repair parts are being made and are available with which to keep the millions of electric appliances running during the war, was the task a committee headed by B. W. Reynolds, PG and E manager of domestic sales, was assigned to ascertain. Parts for appliances made within the past 10 years, and whether the stock on hand was sufficient for 1943-44, were the objects of questions sent to 97 manufacturers of appliances through their Pacific Coast representatives. There were 63 replies, only eight of which reported the situation as bad or hopeless.

It was significant that the large majority of well-known brands of all types of appliances were said by their makers to be backed up by manufacture or reasonable stock of replacement parts—at least the functional parts necessary to operation. On radio sets the situation is not lack of parts but that the Army and Navy orders absorb so much that little is left for civilian radio repairs.

Forrest Naylor, PG and E, contended that it was not enough to know that manufacturers had repair stocks. It was necessary for them to establish deposits of such repair stocks as a revolving fund of them in various centers in the West to expedite their procurement and speed repairs, now from six weeks to six months delayed.

Water Heater Tanks

It was natural to slide from appliance parts to water heater tank replacements. H. C. Rice, Southern California Edison Co. merchandise manager, led discussion on this topic by estimating that, of the 100,000 electric water heaters in the territory of association members, it had been necessary to replace 3% per year. In his own company area this required 125 water heaters per month. The difficulty chiefly is with old models and these represent such a variety of tank sizes, element locations, piping connections and insulating jackets that mere replacement of tank is nearly impossible.

Past presidents at the luncheon meeting in San Francisco from left: W. L. Frost, S. E. Gates, C. E. Houston, A. E. Wishon, R. M. Alvord and George C. Tenney

Rusted tanks that fail are hopeless to repair by patching and only a new tank will do.

This was concurred in by manufacturers' representatives present—Fogwell, of Thermador; Conklin, of Hotpoint; Bauer and Mellon, of Wesix; and Watts, of Westinghouse. Belief was expressed that the gas water heater makers had found a way to obtain new tanks and electric makers could, too. Factory repairs were said to be the only satisfactory ones possible, with "swing" or loan water heaters suggested by Reynolds to tide users over while their heaters were in the factory to get a new tank.

Standardization of water heaters was strongly urged. With old stocks cleaned out, resumption of manufacture should start with utility agreement on a minimum of varieties and sizes so that mass production methods might be applied to reduce costs materially. A resolution to the executive committee urged action on this score.

At the San Francisco meeting H. H. Courtright, Valley Electrical Supply Co., Fresno, urged standardization of cord terminals and repair parts as much as possible and then warned of the possible flood of substandard, unsafe appliances after the war and the need for adoption of the PCEA appliance control ordinance.

"Light Up With Victory"

Ushered by the music of *When the Lights Go on Again All Over the World* and with a dramatic lighted display of a giant V for victory, and a model city whose dimout gave way to restored brilliant illumination, R. B. McFadden, commercial manager, Southern California Edison, asked all the industry to keep ready for a return of lighting with victory.

He recommended a local program in each town sponsored by civic organizations and assisted by the industry. It would require preparation to (1) restore and unmask overhead street lighting, (2) remove paint and shields from ornamental standards, (3) put signs in shape to go on again, (4) restore decorative outdoor lighting, (5) relamp window lighting units, (6) restore markee lighting, (7) turn on searchlights and spectacular lighting, (8) raise the shades of homes and turn on porch lights again.

Dealer Personnel

The final session on each program swept a wide field of dealer personnel and priority problems and proved the liveliest and most varied of all discussions. J. Clark Chamberlain, manager, Bureau of Radio and Electrical Appliances of San Diego County, presided and first discussed the situation in San

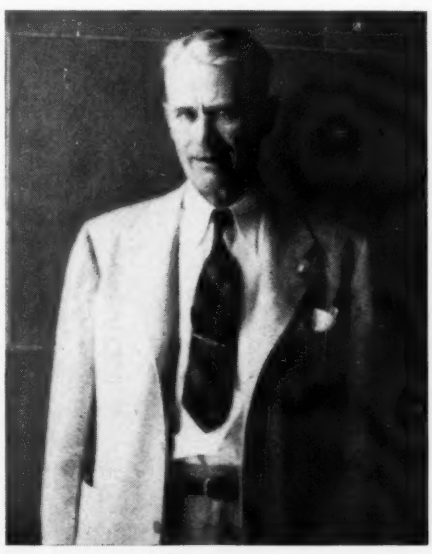
Gates Angle

Diego, the variety of measures used by the bureau to assist dealers to continue to exist. He called upon H. C. Rice and B. W. Reynolds to describe the results of training programs for repair personnel in Los Angeles and San Francisco respectively.

The need for personal assistance to dealers to aid them to digest and use the various priority and other orders to their fullest advantage rather than give up in disgust, was stressed by several speakers. The various training programs of manufacturers were explained. Assistance in protecting and lifting repair and reconditioning ceilings in order to permit dealers to pay more for help and work on the untouched stocks of reclaimable used refrigerators was urged by others.

Various possible sources of manpower—women, incapacitated, elderly, school boys, even prisoners—were discussed and explored. Hopeful sign, said Milo Cain, Coast Counties Gas & Electric, was that, with major construction tapering off, many electrical

Pine



contractors were returning to small towns and determining to stick it out with repair work.

Courtright gave an inspiring close to the San Francisco meeting by telling how to urge dealers to build prospects from those they have to turn down for future sales, urging the courtesy that distressed customers now seldom get as a goodwill builder on which they can cash in when selling can be done again.

Operating Economics

EFFECTIVENESS of conference type discussions was demonstrated at both the northern and southern meetings of the Operating Economics Section, where 78 people attended each session. Chairman H. A. Lott, Southern California Edison Co., and acting vice-chairman E. A. Crellin, Pacific Gas and Electric Co., had arranged provocative subject matter which was capably handled by the various discussion leaders. The multiple advantages accruing from standardization and repetitive manufacture as presented by S. W. Scarfe, General Electric Co., (ELECTRICAL WEST, June, 1943, p. 89) were largely concurred in with a few modifications and exceptions.

Successful attainment of the advantages of standardization must include provision of initiative in development, according to W. R. Frampton, Southern California Edison Co. This will involve coordination between manufacturers' and customers' engineering departments. R. A. Hopkins, Westinghouse, noted that over 100 different turbine combinations are available in the 500 to 7,500-kw. classification and 139 different combinations in the 10,000 to 50,000-kw. class with only nine due to size. He said a standard parts plan has been evolved by his company in the manufacture of power transformers.

A. A. Kroneberg, Southern California Edison, cited an opportunity for bringing standardization into the voltage ratings of power transformers. Edison has partial standardization with 3,000-kva. units in the 66/11-kv. transformation and 5,000 kva. for 66/16.5 kv. Standardization of physical sizes and shapes of equipment of similar ratings would simplify station design, according to A. A. Straub, Southern California Edison. A. F. Pride, Westinghouse, pointed out that volume of business would largely govern savings from repetitive manufacture and questioned the desirability of extension of this practice too far. C. M. Parker, California Electric Power. expressed the hope that repetitive manufacture would not eliminate the smaller

Brown Rice Angle

manufacturer who has contributed excellent equipment and apparatus over a long period.

Customer acceptance and use will largely determine the success of standardization and repetitive manufacture in the opinion of S. J. Lisberger, PG and E. He urged that the manufacturers advise customers just what equipment lends itself to such standardization and that the ultimate program be worked out cooperatively with both groups willing to make concessions in the elimination of "pet ideas." He pointed to instances where standardization had been worked out—notably in the case of underground cable—and then promptly forgotten when initial orders were placed. The customer is the one who must adhere to standards, according to him, and reasons for non-adherence should be exceptions and should be passed upon by top authority.

F. H. Searight, Allis-Chalmers, urged that while some apparatus was admirably suited to standardization procedure, caution be used in extending the movement too far. He stated that the possibility of repetitive manufacture of major stationery generating equipment was remote because station economy is in a great measure affected by operating conditions which are beyond the control of the designer.

Confining his discussion to station power transformers, H. A. Laidlaw, PG and E, affirmed that repetitive manufacture would result in real savings comparable to those which accompanied standardization of distribution transformers. Difficulty lies in lack of standard transmission voltages. Delta-wye systems now can obtain standard equipment, he pointed out, but the Pacific Gas and Electric system operates wye-wye, thus requiring a tertiary winding that is self-protecting. Repetitive manufacture has not been applied to this equipment.

W. L. Winter, Westinghouse, pointed to differences in the definitions of repetitive manufacturing, quantity production and standardization and cautioned against the interchangeable use of these terms. Both volume production and standardization are required to insure high-quality, low-cost products. Acceptance of standards requires creation of a state of mind in the engineer in which he questions every deviation, according to Stanley Rapp, Pac. Tel. & Tel., who pointed to the fact that the telephone industry, probably the most highly standardized of any, had found that standardization did not stifle development. Both D. I. Anzini and O. A. Gustafson, General Electric, cited recent instances of successful standardization in other industries—ships by the Navy and Maritime Commission and diesel-electric locomotives by the railways.

E. F. Sixtus, Pacific Electric Mfg. Co., summarized the discussion with the statement that both manufacturer and purchaser should be in agreement on standardization, whereas in the past the customer has been too prone to leave the subject solely to the producer. If ideas or objections are voiced at the joint meetings such as EEI-NEMA hold, he claimed that standards which would be both acceptable and satisfactory could be established.

A variety of methods of increasing capacity for the purpose of saving critical materials in addition to those cited by J. V. Kresser, Westinghouse, in his paper (ELECTRICAL WEST, June, 1943, p. 93) were brought out in the discussions. N. B. Hinson, Southern California Edison, pointed to instances where equipment had been up-rated without causing overload on the Edison system. He also indicated how study of equipment duty, with the idea of possible transfer to higher duties, can save large quantities of new equipment. This was done in the case of bringing Boulder power into the Edison system.

A. D. Brown, Allis-Chalmers Mfg. Co., while agreeing that transformers —particularly the older ones—could be up-rated, pointed out that close cooperation with the manufacturers was required to preclude possible burnouts. A. F. Ayres, Calif. Elec. Power Co., mentioned the possibilities of taking advantage of low temperature water at hydro plants for cooling purposes and also suggested that smaller equipment in stations, such as batteries, could be moved to cooler locations. He classed protection against damage from extreme weather conditions as equivalent to conserving materials.

It was pointed out that customer load estimates were frequently inaccurate and hence caused installation of excess capacity. A. A. Kroneberg, Southern California Edison, stated that experience indicates that a peak of 200 watts per horsepower could be expected from ordinary connected loads. It was urged that companies exchange data on the relationship of peak and connected loads of various types of Army cantonments and camps, since most initial estimates of this class of load were extremely inaccurate.

H. T. Sutcliffe, PG and E, raised the question as to what constitutes normal life expectancy in a power transformer, pointing to differences in definition between operating and design engineers. He stated that applying the 8° C rule, it has been determined that a transformer carrying a rated load in an ambient temperature of 40° C will have an average life of seven years, whereas operating in an ambient of 30° the life would be 15 years. The operating engineer wants to know how life expectancy will be affected by carrying greater than name-plate loads for certain periods. F. H. Searight, Allis-Chalmers, presented discussion by J. B. Hodtum of that company, which showed that average copper temperature in a transformer increases as the 1.6 power of the load. Average copper temperature plus the 10° C AIEE hot spot correction will give the approximate hot spot temperature. Thus a transformer with a 7° difference between the average copper and hot oil will have a 36° gradient above the hot oil at 160% load.

Savings in copper and steel resulting from forced-oil cooling were mentioned by J. C. Porter, General Electric, who cited one instance in which forced-air and forced-oil cooling reduced copper 23% and steel 28%. Core and coils can be reduced 40% when forced-oil is used with, however, an increase in impedance.

H. A. Laidlaw, PG and E, suggested that overloaded induction regulators set for 10% buck or boost could be reconnected for 5% regulation and thus double the capacity of the regulator. It was pointed out that contacts rather than windings determined the capacity of step-type regulators.

Difficulties encountered in the field in determining transformer overloading by temperature readings of dial type thermometers were reported due to misplacement of the thermometer bulb. Operating procedure, it was re-

Reynolds Chamberlain

ported, is still to test temperature by placing the hand on the transformer tank—"if you can't hold your hand on the transformer, it's too hot." J. S. Kay, PG and E, urged study of weather bureau temperature records to determine ambient temperatures which would permit overloading during specific periods of the year.

Stringency of wartime manpower conditions was emphasized in discussions of two papers—*Personnel Safety* by Howard Miller, Southern California Edison safety supervisor, (EWEST, June, 1943, p. 91) and *Personnel Training* by A. A. Straub, Southern California Edison Co. (EWEST, June, 1943, p. 95). Conclusion at the southern meeting was that some type of training is required today for both supervisors and workmen based upon the following ideas:

1. Men in supervisory positions are directly responsible for the safety and job-training of workmen.
2. Safety training and job-training today are of equal importance.
3. Closer contact is required in wartime between superintendents and foremen.
4. More careful selection of men for supervisory positions is essential, with increased consideration given to mental attitude toward safety and potential ability to train men.
5. All men in supervisory positions should be included in any safety or job training program.
6. Sufficient time should be allowed the supervisor for training the men under him.
7. Company-conducted schools in foremanship and specialized job training should be considered.

That the foreman warrants increasing attention because he is the contact point between management and labor was the contention of A. J. Noia, PG and E, in the northern discussions, which brought forth the following suggested specific steps for keeping foremen better informed:

1. Information bulletins regarding changes in draft regulations and the manpower situation both now and after the war should be issued to foremen so that the crew members would acquire the habit of looking to him as a source of authentic information.
2. The foremen should be provided with personnel advice and training and a periodic review of working conditions.
3. Instructions should be issued the foremen on the use of special manpower saving equipment and the adaptation of new construction methods.
4. The foreman should be made responsible for the training and advancement of every man under his supervision. He should be advised and assisted in grading the men into jobs which they can perform and to undertake the problem of job breakdown so as to get the work done with the type of men available.
5. A superintendent should have a personal interview with each foreman if possible at weekly intervals.

L. A. Wolbert, B. R. Trout, A. Balchin, Henry Buell and T. B. Copeland, all of PG and E, argued in favor of greater assistance for the foreman, both in training people and in relieving him of work extraneous to his primary duties.

Discussion of the paper on plant protection by G. A. Hunt, PG and E, (EWEST, June, 1943, p. 83) brought forth the fact that there have been no bona fide cases of sabotage on utility properties in the U. S.

Left to right: J. C. Porter, General Electric Co., San Francisco; C. E. Baugh, C. B. Nelson and B. K. Dunshee, Pacific Gas and Electric Co., San Francisco

Administrative

HOW to take manpower and material shortages in stride, while maintaining service and customer good will occupied the attention of the Administrative Services Section at both northern and southern meetings. To permit each group to attack these wartime problems from its own angle, parallel sessions were arranged by Chairman L. C. Rausch with group sponsors, F. C. McLaughlin, accounting; William de Waard, purchasing and stores; J. A. Long, credits and collections; E. A. Long, personnel and public relations.

Manpower

Round-table discussion, led by R. R. Walbridge, So. Cal. Ed., in the south and L. J. Nevraumont, PG and E, in the north, developed that utilities represented are making available manpower go further by curtailing non-essential services; putting women into men's jobs; reducing age restrictions and, in certain cases, physical standards; utilizing students parttime and pensioners, who "know the ropes" and are glad to return to work for the duration; and by adjustments within the organizations.

Women, who now make up as high as 50% of the entire personnel in some instances, were reported to be good on most counter jobs, at collections and wherever public relations were involved. Their ability as meter readers would seem to be a subject on which there can be no generalization, unless it is "choose wisely, train carefully, then proceed at your own risk."

Southern California Edison Co., with almost half its meter readers women, has had uneven results. W. J. Crock, Compton district manager, reported that women were reading on an average of 235 meters per day as compared with 265 for men and that the percentage of errors was substantially the same for men and women. He also stated that women are reading demand meters in his district and changing tapes after thorough training. At Long Beach, too, women are proving satisfactory, producing within 85% of the men's average with errors about one in each 2,900 readings. Other districts reported high turnover and a tendency to "curbstone" reading. M. W. Phillips, San Joaquin manager, stated that he did not believe sex determines ability but that the important factor is proper selection and training. It was pointed out, also, that competition is keen, making it difficult to secure qualified women, particularly in war centers, and that the job is hard.

W. H. Park, PG and E, said that women in the East Bay area were averaging 75% of the record of experienced meter readers and that was as well as some of the new men could do. His district is not splitting the meter

books but sending out a man the second day to finish the routes. Park suggested that one or two minutes a call could be saved by showing meter locations on the books. Some companies have been doing this.

As an alternative to women, some are hiring boys to read meters after school, working three hours a day. Pacific Gas and Electric representatives said that this idea had not taken hold in their territory, where meter reading was considered an eight-hour job.

A. J. Noia, PG and E, advised taking inventory of the skills available within the organization and using these skills to the best advantage. It was pointed out that the interpretation of skills is different today, with emphasis on the ability of an individual to use his hands. Difficulties presented by housing, where transfers were involved, wage adjustments, downgrading and upgrading were recognized; but it was pretty well agreed that companies must make the best of these situations.

Except where an employee wants to help out with farm work, dual employment is being discouraged for reasons of efficiency, health and safety. That this dual employment might bring complications in health benefits also was pointed out. Some companies have received requests for leaves of absence from employees who wanted to take higher pay jobs. These were refused, although, in some instances, companies have given three-month leaves where some particular war job required an employee's skill.

Utilities would seem to be generally successful in convincing draft boards and government agencies that a power company cannot strip down to its last man and maintain service. Companies are not requesting deferments except for essential men. One reported that, out of 18 requests, only three had been turned down and four had been renewed. Another reported three and four termers on its renewals.

It was suggested that companies make up their own certificates of availability, conforming with certain legal restrictions, and that employees be informed that the power industry has been declared essential.

Service

Although the "super deluxe" utility service of prewar days has had to give way before tire and gasoline restrictions and manpower shortages, the brand offered today is still "deluxe." This has been accomplished by staggering working hours, routing calls and by skilful use of the telephone. Curtailment of non-essential and special services is being handled, for the most part, without loss of customer good will, it was indicated.

As a general rule, no service calls are scheduled for a specific time, although an attempt is made to fix the appointment for morning or afternoon. A clear understanding between the customer and the utility employee receiving the call is essential to avoid call backs and customer inconvenience. Properly trained employees on the front counter and the telephone can screen out unnecessary calls, can expedite service by finding out what the trouble is, and frequently can tell the customer how to make the repair himself.

Discussion indicated that unlocks, "no light" and "no power" complaints, and other essential requests are being taken care of the same day or the same evening, if a delay would inconvenience a customer, although these situations are more difficult to handle in rural areas under present handicaps. It was also indicated that established policies to furnish fuses for restoring service and to make screw driver repairs should be continued. Some districts reported that, after attempting to instruct a customer on replacing a blown fuse, it was necessary to send a service man.

Consensus was that curtailment of range and water heater service is not possible to any large extent. Southern California Edison reported that, except in emergency, it makes no definite promise as to when the call will be made, just that it will be as soon as possible. If an oven is out of order, the policy is to take care of it the same day. The company is using range repair servicemen for this work, but is having trouble securing parts.

F. U. Naylor, PG and E, said that in his territory parts from old ranges are being used for repairs. The company is standardizing on five types of element. It was reported almost impossible to secure thermostat repairs. Fuses, also, were reported difficult to get in some instances.

Bi-Monthly Billing

E. J. Chrisman, So. Calif. Ed., presented a report on experience in the Lancaster district with bi-monthly meter reading and billing. He stated that meter books had been divided so that approximately the same number of meters would be read each month. Experience so far indicates savings of approximately 45% in auto mileage, 35% in billing and balancing time and 50% in stationery and stamps. Bills are pro-rated, if the billing interval is less than 57 or more than 63 days. Customer acceptance of the plan has been very satisfactory, he said, with a decided preference for this system over the postcard reading previously tried. A small increase in high-bill complaints has resulted.

Disconnect notices are mailed to delinquent customers 15 days after presentation of the bills. On expiration of this notice, bills are turned over to the serviceman to follow up when his work brings him into the district. If this fails, the accounts are attached to the meter sheets, and an effort is made by the meter reader to secure collection at the time the meter is read for the second billing period. No change has been made so far in the amount of deposit required and the system is too recent to provide data regarding losses, Chrisman said. Customers are invited to come into the office and pay on the off month, if they wish, and approximately 15% are making these voluntary advance payments.

Charles Davies, San Diego G & E, said such a procedure was not contemplated by his company, which was utilizing customer readings, supplemented by company readings every three months in the rural areas. A comparatively large percentage of customers fail to mail back the cards, Davies stated. Leon S. Heseman reported that California Electric Power Co. is experimenting with bi-monthly billing; has tried and discarded postcard readings. Permission to increase residential deposits had been secured, he stated.

A. D. Church pointed out that Pacific Gas and Electric Co. had recently received Railroad Commission approval to extend bi-monthly billing to any area on the system, lifting the restriction limiting it to rural areas.

E. T. Crick, Coast Counties G & E, stated that where bi-monthly reading had been introduced by his company, estimated bills were presented on the off month. In general, this estimate is based on the consumption of the corresponding month of the previous year. Only five customers had refused to pay an estimated bill, he stated, and these were not pushed for payment. No customer is shut off for non-payment until an actual reading has been made.

Admitting that it might be difficult to estimate electric consumption in rural areas on the off months because of the variation in pumping loads, Crick suggested that at least the "demand" charge might be billed monthly. A. J. Petsche, PG and E, pointed out that most customers with a "demand" type of rate also have a domestic account and probably would not find it convenient to pay one bill one month and two the next. He said that in his

territory customers generally seem satisfied with bi-monthly billing.

While it was agreed that collections present no real problem under today's economic conditions, it was pointed out that curtailment of collection service together with wartime working schedules are making it difficult for customers who pay their bills in cash. Establishment of subagencies in drug and other neighborhood stores was one suggested remedy for this situation. Other possible solutions were American Express agencies and depositaries for after-hour payments at the company offices.

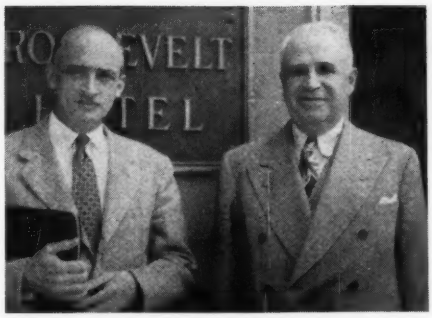
Customer Relations

Reporting on a study to index factors influencing customer good will, F. U. Naylor, PG and E, listed as dominant: (1) personalized and courteous service by all customer contact employees; (2) high level of service, sustained notwithstanding the necessity of conserving mileage and manpower; (3) low rates in face of rising living costs; (4) assistance with various WPB regulations and procedures; (5) employee participation in civic projects and wartime agencies; (6) assistance to customers on care and use of appliances and cooperation through dealers to help customers get necessary repairs.

Conditions that might result in undermining good customer relations were disclosed as: (1) necessary wartime changes, such as bi-monthly meter reading and billing; discontinuance of field collectors; new, inexperienced employees handling customer transactions; (2) failure of the utility to define clearly intent of wartime service policies and thus enable all departments to coordinate their efforts to serve the customer properly; (3) failure to analyze and correct conditions that customers misunderstand or that are detrimental to good public relations.

A. L. Laws, So. Cal. Ed., pointed out that, in industrial districts, more requests are being made to utilities for technical advice and expressed the opinion that it would be difficult to refuse these services. R. R. Walbridge inquired what was being done to assist small shopkeepers, service station men and others forced out of business by the war. Laws stated that, where small industrialists had been forced to close, he was making an attempt to secure as tenants for their buildings concerns that have war contracts.

R. G. Kenyon, So. Cal. Ed., pointed to the importance of improving technique in dealing with the public and suggested that some basic data should be collected on the work of each em-



Rausch Walbridge

ployee so that it could be passed along to new personnel, with variations to fit conditions in different types of districts. He stated that there should be some definite manner of disseminating information to employees regarding the company and proper methods of meeting the public. There must be a better way to perform many duties, he insisted, and surveys should be made to determine them.

Accounting, Purchasing

Accounting and purchasing groups met together during the morning sessions to discuss disposition of surplus, idle and obsolete material under WPB and OPA regulations. Discussion was detailed and many helpful suggestions were carried out of this valuable session.

W. J. McCullough, former general storekeeper for Southern California Edison and now Los Angeles district chief for the WPB utility inventory control division, urged utilities to list with that office on WPB form UF-22 all surplus material above the practical working minimum as defined in Order U-1. Idle and obsolete material should be tabulated on a separate form. He stated that utilities should report completed transactions for the perpetual record. Approximately 30% of the inquiries received result in sales, McCullough said.

Some companies are listing surplus items, such as line hardware as a lump sum quantity and others are furnishing detailed information.

One company is setting up two inventory cards: one representing the practical "working minimum" inventory as specified under U-1 and the other carrying a record of the surplus material. All items withdrawn are taken from the surplus card and this provides a means for reporting to WPB at the end of each month.

Another company has divided its inventory stock card into three columns: one giving the practical working minimum; one showing material segregated for special approved projects; and one for recording surplus. Withdrawals are posted in the practical working minimum column and, at the end of the month, are posted to the WPB record and reported.

In reply to a query regarding procedure of companies who had no established practice for selling new equipment and, therefore, are losing on shipping costs under MPR 136 (controlling sale of machines and parts), it was suggested that such companies file application with the regional OPA, stating the case and asking permission to charge an overhead expense or handling charge. Otherwise items of expense must be confined to those in effect on Oct. 1, 1941 and Mar. 31, 1942, depending upon whether the machine is listed under Appendix A or B of MPR 136.

Following discussion of regulation MPR 204 (for determining maximum prices of idle or frozen materials listed under priorities regulation No. 13) it was pointed out that this regulation is now in process of revision and utilities in the area should recommend to the OPA regional office that they be allowed to sell to one another at book cost, such cost to include the usual Supply Expense charges in effect in October 1941. Permission to add such shipping expenses as crating, loading and transportation also should be requested, it was decided.

Scrapping of unusable material was advanced as a means of assisting the war effort, saving storage and inventory costs, taxes and insurance and conserving manpower. Losses so incurred could be charged off against any surplus profits, it was pointed out, and items sold or scrapped do not have to be included under U-1 withdrawals when written off.

One company has established a material disposal committee composed of representatives from the stores, operating and accounting departments. This committee makes a visual inspection of material in question and anyone recommending an item for possible future use is held responsible for its withdrawal within a period of three years. A pricing committee of representatives of the stores and accounting departments and the head of the salvage department determines the minimum sales price of obsolete material.

It was suggested that a committee be organized to represent the utilities in the region and to present to WPB any complaints regarding rules and regulations which are working a hardship.

In general, execution of priorities has been centered in a separate division and is supervised by a member of the accounting department, a procedure which it was agreed saves considerable time.

Wholesalers Air Problems

First meeting since Pearl Harbor brings 185 to NEWA Pacific Division session in Santa Barbara

LABOR SUPPLY and efficient labor utilization, the part advertising can play in supplementing or substituting for salesmen, and the extent of postwar electrical markets featured the war conference held by the Pacific Division, National Electrical Wholesalers Assn. at the Biltmore at Santa Barbara, June 17-19. Harry E. Perl, president, State Electric Supply Co., Oakland, was elected chairman succeeding D. A. Smith, Graham-Reynolds Electric Co., Los Angeles. The meeting was the first since Pearl Harbor and drew a total registration of 185.

Problems incident to the labor shortage, including the application of the 48-hour week which now is effective in four West Coast metropolitan areas, formed the basis of a panel discussion led by M. G. Sues, Los Angeles manager, Leo J. Meyberg Co., Major W. L. Burroughs, director of industrial relations, Ordnance Division, and Capt. D. E. Ring, regional labor officer, Ninth Service Command, contributed information on relationships with Selective Service as regards deferments, and methods being used to analyze jobs and train employees for greater productivity. Temporary breakdown of discipline and failure to understand the relation between his job and the war effort have been the principal contributors to worker dissatisfaction according to Major Burroughs.

Discussion of the labor situation brought out the fact that it is wise to file 42A or 42B Selective Service forms with draft boards for all employees in the 18-38 year category. It was urged that manning tables be filed as well to cover all men in that group. No uniform practice had been adopted in the application of the 48-hour week in those areas classed as No. 1 critical by the WMC. Some wholesalers are operating certain departments 48 hours and others 44 hours. Office personnel, particularly women, had been loathe to accept the 48-hour week, it was reported.

How an investment of almost $2,000,000,000 in new industrial facilities occasioned by the war will affect postwar manufacturing on the Pacific Coast was discussed by George C. Tenney, editor, ELECTRICAL WEST. New procedures of electrical apparatus, supplies and appliances will develop from present makers of war goods, he predicted, and the wholesaler must take cognizance of the needs of these new people for distribution. What forms of advertising can be used at present to substitute for salesmen and to maintain contacts with old customers, were brought out in a panel discussion led by W. G. Figroid, manager, Gilson Electrical Supply Co., Oakland, who told how his organization uses direct mail effectively. The discussion led to a resolution endorsing the national advertising plan undertaken by NEWA and asking for its extension to other fields.

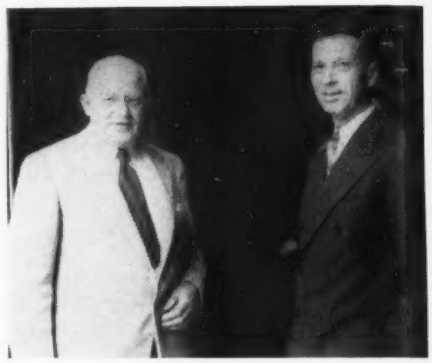
Postwar markets anticipated by the power companies and their effect on the wholesalers' business were described by three utility executives. C. E. Houston, vice-president and general manager, Southern California Edison Co., reported that upwards of 300,000 kw. of present war load will drop off with the coming of victory and that plans are being made to market this energy to residential and commercial customers through the promotion of greater use of electrical appliances.

J. H. Polhemus, president, Portland General Electric Co., stated that his company's plans are based on doubling the present load, principally in the residential and commercial fields. K. M. Robinson, president, Washington Water Power Co., Spokane, said his company expected to raise the present average domestic consumption of 2,500 kwh. per year to 4,000 kwh. All of this will demand expanded electrical distribution facilities with resultant markets for equipment and supplies, as well as for the appliances which will go into the homes, they said.

Interpretations and changes in CMP order No. 5, in L-63 and in PD-lx, similar to those presented at the recent national NEWA war conference were discussed by C. C. Whittington, production analyst, WPB, Los Angeles. Leonard E. Read, general manager, Los Angeles Chamber of Commerce, presented a stirring defense of the competitive enterprise economy.

In the golf tournament the cherished Copper Cup was won by W. G. Figroid, the Manufacturers' Cup by Walter G. Thompson, Pacific Coast manager, Westinghouse Lamp Co., and the Central Station Cup by J. E. E. Royer, vice-president and general manager, Washington Water Power Co.

D. E. Harris (left), Pacific Coast vice-president G-E Supply, with Harry Perl president State Electric Supply Co., Oakland, new Pacific Division chairman



J. P. Carson, Graybar San Francisco district mgr., E. E. Buerkel, sales mgr. Incandescent Supply, San Francisco

M. G. Sues, Los Angeles mgr. Leo J. Meyberg, and Walter Thompson, Pacific Coast mgr. Westinghouse Lamp

Dave Salsbury, Seattle mgr., and Clyde Williams, San Francisco district sales mgr. Westinghouse Elec. Supply

IAEI Schedules Annual Meet

Pertinent wartime considerations face inspectors at Southwest Section conclave Aug. 30 to Sept. 1

INDUSTRIAL X-ray hazards, electronic motor control, trends in wire insulation, critical materials, bus bar capacities, wiring of war plants and a number of other pertinent wartime considerations facing electrical inspection and safety will be the meat of the annual meeting of the Southwestern Section, International Association of Electrical Inspectors, to be held Aug. 30-31, Sept. 1, at Hotel Clark, Los Angeles. O. D. Butterfield, city electrical inspector, Torrance, Calif., is its president. The IAEI president, T. W. Bowry, of Richmond, Va., will also be present to address the gathering.

The program, as announced by Harold L. Gerber, chief inspector, San Francisco and secretary-treasurer of the section, has been designed to bring authoritative current information to inspectors from qualified speakers upon the practical problems of the present war times. A new postwar planning committee will also initiate a program for inspectors to plan how to readjust to peacetime the many temporary and makeshift installations permitted for the duration.

The new rules pertaining to the wiring of machine tools, article 670, will be discussed by G. E. Kimball, Industrial Accident Commission electrical engineer and member of the Electrical Committee which writes the National Electrical Code.

Electronic motor control devices will be discussed by a General Electric Co. speaker, and *Industrial X-ray Installations* by E. Dale Trout, General Electric X-ray Corp., Chicago. *Trends in Conductor Insulations* will be told by H. W. Weber, U. S. Rubber Co., New York and *Critical Materials in War Housing* will be discussed by George D. Riddle, chief architect, FHA, Los Angeles.

The peace we are fighting for as it affects inspection departments will be the topic of J. J. Siddall, electrical engineer, H. H. Robertson Co., Pittsburgh. M. G. Sues, Leo J. Meyberg Co., Los Angeles, will present the Pacific Coast Electrical Assn. uniform substandard appliance control ordinance.

Larry Trim, electrical inspector, Burbank, Calif., has had more experience with war plant electrical installations than most and will discuss them on the Tuesday session. Bus bar capacities in relation to size and arrangement will be told about by A. G. Van Norman, Trumbull Electric Mfg. Co., Los Angeles.

Secretary-Treasurer Victor Tousley, IAEI, Chicago, will tell of the inspector's association affairs and assist in discussion of interpretations and interim amendments to the 1940 National Electrical Code. G. E. Kimball also will discuss these amendments.

The new Type S fuses without lag features will be described by James S. Mahan, Fustat Manufacturers, Chicago. *Underwriters' Laboratories Standards for Emergency Installations* will be discussed by Howard Dodge, senior engineer, Underwriters' Laboratories, San Francisco.

Two speakers—one from the Maritime Commission, another the Army—will be heard also. On Tuesday and Wednesday mornings the customary free discussion Code Breakfasts will be held, led by W. J. Tretheway, Huntington Park and O. K. Jones, chief inspector, Los Angeles. The Southern California chapter plans a buffet luncheon for the delegates on Wednesday noon and the electrical industry of Los Angeles through the Electric Club plans to furnish some entertainment and a visit to one of the large national chain broadcasting studios.

Meeting arrangements are under the general direction of Frank Short, Industrial Accident Commission, Los Angeles, with assisting committees headed by R. J. Manahan, registration; Mr. and Mrs. W. J. Tretheway, reception; H. C. Rice, information and transportation; H. G. Ufer, hotel and social; J. G. Moyen, exhibits and entertainment; Clem Purviance, golf; H. L. Gerber, program and finance; W. A. Cyr, publicity; Mr. and Mrs. Arthur Veit, dinner and dance.

Extra Meeting in South

Enough wartime difficulties were uncovered in the discussion at the Southern California Chapter, International Association of Electrical Inspectors meeting at Long Beach, May 26, to cause a unanimous vote for an extra meeting on July 21, at the Edison auditorium. W. J. Tretheway, chairman, presided and Ben Wheates, electrical inspector, Long Beach, played host at this session due to the illness of Otis W. Newcomb, chief inspector.

Among war brought problems discussed at Long Beach were: open wiring in industrial plants, required by WPB but considered unsafe by California's Safety Orders, with the latter taking precedence in places of employment; use of treated plywood for raceways; high voltage services in buildings, exceeding the 5,000-volt Safety Order limit; deaths resulting from unsafe wiring of coin boxes for remote control of juke box phonographs in restaurants; deaths from improper electric fence controllers, also from home made electric fly traps.

A resolution was passed asking that every device or appliance approved by underwriters be plainly marked. When Al Drew of Las Vegas told that he was asked to step aside by the government in jobs involving federal works, he was advised to get a letter from responsible officials relieving him of responsibility.

A pipe and tobacco pouch was presented to R. H. Manahan, chief of the electrical division, Los Angeles, who retired June 1. Manahan has been one of the charter members of the chapter and Southwest Section IAEI.

Lamps Can Be Lethal

Germicidal lamps may be as lethal to persons as to germs. That warning came from the study club discussion which preceded the June 1 meeting of the Southern California Section, Illuminating Engineering Society. In this case the study club subject overshadowed the regular meeting program speaker, who talked on a war subject, in value to the lighting men present. The study group was led by F. A. Leach, Bureau of Power and Light. Experts who testified as to uses and cautions necessary with short wave germicidal lamps were John Shannon, Keese Engineering Co., H. J. Chanon and L. H. Hruby, General Electric Co. Lamp Dept. Urban Beh, General Electric Supply Corp., is chairman of the section.

Discussion brought out both laboratory and field experience with germicidal lamps. The uses quoted included sterilizing air in air conditioning systems, in refrigeration boxes for the tenderizing of meat, sterilizing dishes. But caution was emphasized as necessary not to use such lamps where people may be exposed to their rays for long periods of time since the rays which kill germs also destroy human tissue and their destructive effect is accumulative, as with X-rays. If used in rooms to sterilize air, the lamps should be completely shielded and arranged to provide indirect diffusion.

Northwest Accountants Meet

Streamlined round-table conference at Seattle covers personnel, materials, operating methods

Fryou Clawson

THE Northwest Electric Light & Power Assn's new plan of holding shorter and more frequent streamlined round-table conferences in its several sections drew 25 key men from accounting departments of member companies to the second accounting conference in Seattle June 14 and 15. J. H. Clawson, Puget Sound Power & Light Co., chairman of the Accounting & Business Practice Section of the association presided. The program covered subjects of timely interest which were treated in round-table manner under discussion leaders.

Under personnel problems with particular reference to the stabilization of wages rule most companies were found to be going from a 40-hour toward a 48-hour week. Most companies were working outside men under Union contract 48 hours with 42½ or 44-hour weeks in offices and clerical help. The Portland companies, Northwestern Electric Co. and Portland General Electric Co., previously closed Saturday mornings, had opened their cashiers and customers service offices Saturday mornings.

Clause R. Groth, Pacific Power & Light Co., who led this discussion, pointed out that increased working hours with time and a half for time over 40 hours had increased the pay of some clerks and other workers above the pay received by their supervisors who were not subject to overtime rule. This indicated an adjustment of pay was necessary and the companies had applied to the War Manpower Commission, the War Labor Board and the Treasury Department for permission to make these adjustments, and felt the chances of getting them through were good. All companies had classified and defined several jobs for the purpose of establishing wage schedules, and some companies had reclassified these as many as three times.

Surplus material accounting and handling was discussed under the leadership of R. W. Lawlor, Northwestern Electric Co. Many companies are seeking to devise adequate record of surplus materials by tagging and earmarking this material, but few had attempted physical segregation. One experiment in physically segregating surplus stocks from practical minimum working stocks had been tried in Idaho Power Co. where a warehouse has been set aside for storing the surplus. Company districts kept their working minimums up by requisition against this warehouse just as though they were purchasing new material and all such requisitions passed through the purchasing department.

C. P. Heidinger, Puget Sound Power & Light Co., cited a number of internal checks that should be maintained in the company accounting system, even in the face of the manpower shortage. In fact, these checks are more important than ever, said Heidinger, because of new and comparatively untrained help now employed in these departments.

Quarterly meter reading, estimated interim bills, postcard meter reading and other short cuts in customer accounting that have been instituted within the past few months by several of the companies were reviewed and were found to be working generally satisfactorily. One exception in these short cuts was Portland General Electric Co., which is still reading monthly. E. W. Bredemeier of that company, who led this discussion, told of using meter readers for many kinds of customer contact work formerly carried on by other employees, thereby justifying monthly reading. The installation of new billing machines in that company had cut billing time and cost through eliminating some billing clerks needed under the former method.

Studies leading to the establishment of units of property for retirement purposes in Idaho Power Co. were explained by V. T. Montgomery of that company who led the discussion of this subject. The question arose as to what price should be applied to these units and, though no absolute agreement was reached, consensus was that an average of from five to ten years should be the basis rather than more recent prices, since, generally speaking, it was the older pieces of property that were to be retired.

Analysis of commission requirements as to what should go into account No. 100.5 Acquisition Adjustments, and what should go into account No. 107, and how these accounts should be written off through surplus or amortized through earnings was made by Paul R. Enright, Eastern Oregon Light & Power Co. A lack of uniformity in commission rulings with respect to these accounts was noted.

The manpower shortage in the territory has brought to a head the desirability of curtailing unnecessary reports, and a discussion of this subject under T. W. Fryou, Portland General Electric Co., pointed out many ways of keeping financial and operating statements made for management down to a minimum number of essential ones. Several short cuts in office routine were disclosed in this discussion. The group also explored the possibility of getting state utility commissions and state tax commissions to use substantially the same report so as to avoid the extra work of making out entirely different forms of reports for each of these commissions. Most state commissions in the territory were found to be calling for substantially the same report as the one rendered to FPC.

R. E. Brennan, PGE treas. and comptroller; Ralph Lawlor, asst. treas., Northwestern Electric; Oscar W. Bennett, asst. treas., Puget Sound Power & Light

Manahan Retires

It would take a rule to cause R. H. Manahan, chief of the electrical division, department of building and safety, Los Angeles, to retire. He has spent a lifetime with safety rules, electrical codes, ordinances, and nobody drew a finer "bead" on interpretation of the codes than "Manny." The rule that decided for him was an ordinance which automatically retires any city employee on reaching the age of 70.

So the 43 years as city electrician terminated June 1, but the encyclopedic knowledge of electrical construction amassed by Manahan will likely be drafted for the war in some way. His associates felt so when they gave him a surprise dinner May 28, at which 218 members of the electrical industry turned out to pay him tribute. O. K. Jones, chief inspector, presided and Gilbert Morris, superintendent of the building and safety department, presented "Manny" a framed scroll commemorating his 43 years of service.

The previous day Manahan's own Southern California Chapter, International Association of Electrical Inspectors, at Long Beach, had surprised him with the gift of a pipe and tobacco pouch as its "graduation" present.

On June 10 the Los Angeles Electrical Estimators, recessed for the duration, was called to a special meeting by its president, C. A. Rowley, in tribute to Manahan. For years one of the regular monthly features was a question and answer session on codes and ordinances presided over by Manahan and his late chief inspector, Harry Beecher. It was a "no program" reunion, that's all.

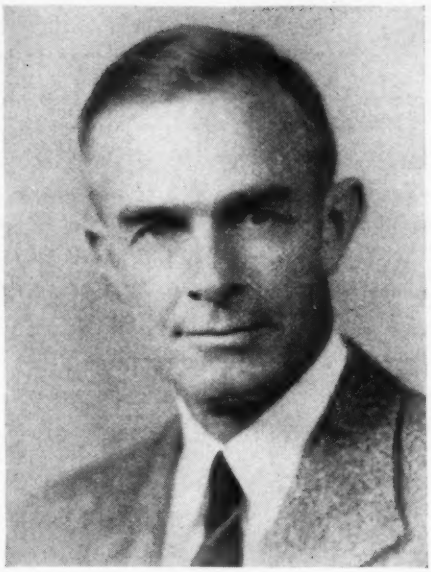
Although Manahan has decided to take a rest and really retire, he did promise friends that he would continue active in the IAEI and other industry affairs.

The City of Los Angeles has temporarily abolished the position made vacant by Manahan for the duration in order to give many eligible men from the department now in the armed services an opportunity in the civil service examination for the post when the war is over.

Westerners Appointed

Westerners appointed on the committees of the National Industrial Service Assn., the national association of motor shops, include F. O. Sievers, Kuchel-Sievers Electric Works, San Francisco, on the cost data committee; Joseph Walta, Littlejohn-Reuland Corp., Los Angeles, membership committee; K. M. Ryals, Stone-Ryals Electric & Mfg. Co., San Francisco, trade relations. T. L. Rosenberg, Oakland, is a member of the executive committee.

New service added, besides the "priority pink sheets," has been *Clarkson's Labor Review*, which gives members similar information as to labor relations and legislation as it does on priorities. Other bulletin service includes an equipment exchange list and a pertinent news sheet pertaining to the motor service shop industry.



Fox

Vancouver Elects

Charles Longley, Longley Electric, was elected president of the Vancouver Electrical Assn. at the annual meeting of the organization held recently. R. Beaumont, Beaumont Electric, was named vice-president, and Secretary J. Homersham, Homersham Electric, was returned for another term. R. Sutherland was elected treasurer.

Members of the association held their annual dinner in the Hotel Georgia at Vancouver.

Victoria Too

R. T. Murphy, Murphy Electric Co., Ltd., Victoria, B. C., succeeds E. H. Emery as president of the Victoria Electrical Assn.

A. Whiteman is vice-president and A. R. Colby, of Colby Electric, has been re-elected as secretary-treasurer, an office which he has held since the association's inception.

H. D. Mainwaring, C. Fensham, E. Cox, and Emery have been named on the executive.

Fox Heads L. A. Club

John Fox, Los Angeles manager for National Carbon Co., was elected president of the Los Angeles Electric Club, succeeding A. D. Brown, Allis Chalmers.

Going into office with Fox are Roy Martindale, Bureau of Power & Light, first vice-president; R. C. McFadden, Southern California Edison, second vice-president; Victor W. Hartley, PCEA executive secretary, third vice-president; W. E. Guy, Graybar, secretary-treasurer; Ray F. Gheen, Ohio Brass, sergeant-at-arms.

The executive committee includes A. D. Brown; John A. Duncan, Westinghouse; Roy N. Phelan, McGraw Hill; Stanley W. Scarfe, General Electric; Walter L. Stickel, Leo J. Meyberg Co.

Meetings

Advances on the wartime engineering front were told to Electric Club members in San Diego and Oakland by Charles A. Scarlott, manager of the Westinghouse Publications Section at East Pittsburgh and editor of the *Westinghouse Engineer*. Among the achievements cited were a practical scheme which gives pilots a new set of eyes enabling them to see the ground despite fog, storm or darkness. He attributed this blind landing system to the ability of radio engineers to throw radio beams in more "fancy curves" than a Carl Hubbell or a Dizzy Dean. Scarlott predicted that future super-airplanes will have "all the components of electrical power systems—power plant, transmission systems, substations, switching and low-voltage distributions system, and possibly lightning protection.

Infrared drying and heating was ably discussed by Walter Stickel, Leo J. Meyberg Co., and Bob Case, Quality Electric, at the June meeting of the Los Angeles EMEA. Many practical applications of this type of radiant heat energy were cited, including drying of enameled and painted surfaces; preheating of metal parts for shrink-fits, as recently demonstrated on landing gear assemblies; heating of laminated wood for glider and plane construction; in the motor rewind field for drying and baking wound rotors, armatures and field coils. It was also reported that agricultural colleges are making exhaustive experiments with infrared lamps in the promotion of plant growth, as well as for protection of citrus fruits from damage by frost.

About 45 members of the EMEA of Northern California turned out to see the DuPont Co.'s films, *Third Dimensional Seeing*, and *Paint Multiplies Light*, when they were shown in San Francisco recently. The talking movies showed how contrast between machines and work can be accomplished with paint and light to increase production and reduce accident rate.

Recent Speaker at the San Francisco Electric Club was Past President Ernest Ingold Day. Day, formerly distributor for Atwater-Kent, was made an honorary member of the San Francisco club. His subject was *A Peddler Looks Forward.*

ELECTRICAL WEST

McGRAW-HILL COMPANY OF CALIFORNIA
68 POST ST. SAN FRANCISCO 4

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As Others See Us

AN outside viewpoint frequently points up a situation in a new light. Sometimes it confirms a hitherto half-suspected truth. More often it calls attention to conditions so familiar as to be overlooked. Finally it gives a new appreciation of opportunities. In this category is the recent forecast of the postwar outlook for the light and power industry issued by one of the foremost economic services in the country. This authority sees a five-year upsurge of expansion instead of a postwar lull such as other industries might experience. Four reasons are advanced for this conclusion.

First and foremost is the contra-inflationary trend of utility rates. In the postwar economy a unit of utility service will be among the cheapest products—at an all-time low in contrast to war inflated prices for all other goods and services. Relatively, utility products will be the cheapest goods available to the consumer and the demand curve will be strongly influenced by this force.

Secondly, there is certain to be a large and imaginative program to electrify the farms of America in which the private utilities will take the initiative. Here in the far West the effort will be toward further expansion of farm electrical usage, since the initial job of bringing power to the farms is largely accomplished.

Third reason for this optimistic outlook is the definite political swing to the right, which not only will restore private capital markets but will give private enterprise a new lease on life. Certainly a lot of the punitive pressure against the power companies will be removed.

Finally, the utilities must play a large role in the postwar planning for full employment. Their responsibility is twofold—as employers of labor and as suppliers of power to all industry.

This optimistic forecast can become a reality, this authority points out, if the utilities display the foresight, the broad vision and the courage which brought them to a position of leadership in American industry. Only political interference can stop it. The increasingly constructive attitude on the part of Congress should allay any such fear and should instill confidence.

A Stake in Free Enterprise

TODAY every business and industry in America is keenly aware that the preservation of private enterprise is a major issue in the postwar economic pattern. Doctors and dentists who have read the famous British Beveridge report and then have studied the master plan proposed by our own National Resources Planning Board, have a new appreciation of the situation. So do the many industrialists who find their factories paralleled by government owned facilities more extensive and more modern than their own.

The Beveridge report contains a social reconstruction program which assures state supported medical service for every person irrespective of his income.

However, industry in general has as much or more to fear from this source. Tremendous investments have been made by the government in industrial facilities. And the NRPB report implies that these should be operated by mixed corporations which would serve as "yardsticks" for privately-operated plants engaged in the same line. Just how much the government could encroach upon or influence private industry is revealed by the figures. The Defense Plant Corp. has invested upwards of $9 billion in 1,400 plants ranging from shipping and aircraft to copper and machine tools. The War and Navy departments have financed billions more. How and by whom these war plants will be run in the future will, in a measure, determine the fate of private enterprise.

Thus the people who have a direct and vital stake in the preservation of free enterprise continue to grow. At one time back in the twenties,

it was only the utilities. And when they pointed out that "your turn will be next" they were met with a smile of derision or a shrug of unconcern. Now it's different, if that is any satisfaction.

Utilization Men

MISTAKEN economy has trimmed some utility company commercial and sales departments down to a "last survivor" basis. More farsightedly others are being retained at as near prewar strength as the draft and manpower shortages permit. In comparing notes, the commercial men, while each defending his own position, revealed to an outsider's viewpoint a hazard to the lone survivor group and a promise to the full war strength group which top managements would do well to evaluate.

Sales work, as one executive pointed out, has always been utilization work, application work, more than it has been mere order taking. Never has there been such a need for clear analysis and careful application of both electrical equipment and energy. The very word, "utility" denotes the service in utilization which a power company provides its community.

While it is hard on salesmen not to have sales to consummate, those who have converted their thinking to rendering an advisory and much needed utilization service are finding a satisfaction in it that is closely allied to the war effort.

In many companies the patient, often discouraging, complicated and involved work the utilization men do to bring a small but vital share of war contracting work to their little local industries not only saves those industries, it puts their tools to war work, their employees, too, while they live at home, it helps the stores at which they spend their pay checks and keeps their homes lighted and using electrical equipment. This practical, localized war work relieves the housing and transportation situation as well.

After the war it is safe to predict that the fastest recovery will be made by those companies which have kept and changed their sales staffs into utility men in the broadest sense.

Postwar Selling

POSTWAR sales and distribution policies can be seriously affected by failing now to plan constructively for the future. New and greatly enlarged markets and new factors—manufacturers, distributors and dealers—in those markets mean new conditions and new opportunities. For example, consider the home laundry equipment market as outlined recently by Donald M. Hobart, director of commercial research for the Curtis Publishing Co. Studies made by him indicate an annual washer market in excess of 2,500,000 units, consisting of 1,500,000 for replacements, 250,000 for newly or recently electrified farms, 500,000 for new homes and 250,000 for expansion of unsaturated market.

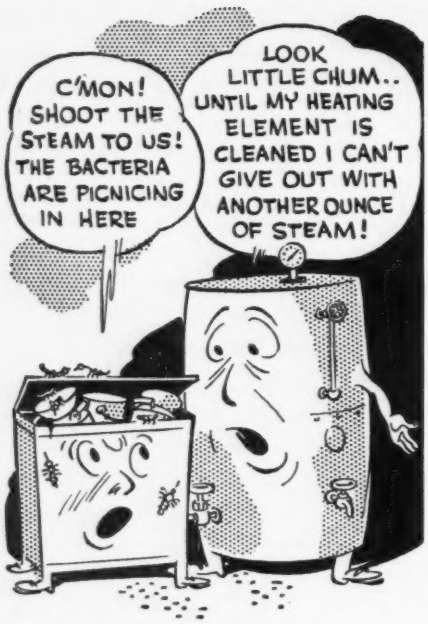
While these figures in themselves exceed any estimates made by the industry, the fundamental thing is the policy which will be followed in selling the appliances. Hobart's study points out that instead of the conventional $49.50 machines, almost half of the sales might be automatic types and another one-quarter combination washer and ironer sales. It's up to the industry, he declares, just what the sales policies will be. "Price selling—as the washer industry has seen—leads to unfair methods, destructive to business, destructive to quality of merchandise, and hence destructive to consumer markets. . . . Quality selling involves the establishment of brands. In such a market the man who builds something plus into his product has an advantage if he can gain recognition for the fact that he has built something extra into his quality."

All of which leads to this conclusion: There is one certainty about the war period, provided business has the intelligence and courage to take advantage of it. All of the bad sales practices—and there have been a lot of them—can be thrown out along with the obsolete equipment. And efforts can be intensified on the good practices. But there must be agreement now that this will be done.

IF we win this war and continue to suppress the rights of the individual to develop his latent ability, we will have lost everything that any free individual can fight for regardless of the military outcome. Most Americans believe that we must first win the war and then "impose" peace on the rest of the world. Obviously, if we continue to follow this pattern, there is no possibility of the individual planning anything. He will merely be a puppet answering questionnaires and taking direction. . . . Democracy has succeeded because it allows the worker to produce his maximum and contribute benefits to himself and to mankind that he never thought were within his power. It isn't beyond the realm of possibility that the individual, given the proper incentive, will be able to progress to so great an extent that he will be able to bring about benefits beyond belief within the next generation. But, in order to reach such objectives, Government must be made for man, not man for Government.—James F. Lincoln, president, The Lincoln Electric Co.

Wartime Care of Farm Equipment

California USDA War Board sponsors program with power companies and extension service


C'MON! SHOOT THE STEAM TO US! THE BACTERIA ARE PICNICING IN HERE
LOOK LITTLE CHUM.. UNTIL MY HEATING ELEMENT IS CLEANED I CAN'T GIVE OUT WITH ANOTHER OUNCE OF STEAM!

A WARTIME program to stress the care of farm electrical equipment is being sponsored by the California USDA War Board in cooperation with power companies, the Agricultural Extension Service and County War Boards. Demonstrations and other steps are being taken to acquaint the farmer with the need for careful maintenance of electrical equipment. Most recently the state war board has prepared a series of short illustrated articles for use in farm journals and for inclusion in advertising copy of power companies.

The series is comprised of seven articles dealing with conservation of farm electrical equipment, electric wiring on the farm, care of farm motors, the right motor for the right job, electric brooders, electrical dairy equipment and a summary. All are based on the importance of electric power to California agriculture, as borne out by the fact that California farms use in excess of half of all electricity used on all of the electrified farms in the U.S.

Typical extracts from some of the series follow.

Immediately ready for work at the throw of a switch, the half million motors located on California's farms "go about their business" quietly and dependably. Ranging from 1/6 to 150 hp. in size, they handle a myriad of farm chores without fuss, or demands for increased wages.

Proper attention to farm motors will assure continued and uninterrupted service. Inadequate care invariably ends up in a costly breakdown, often necessitating an overhaul and a loss in vital food production and farm income. A one horsepower motor, taking "time out" for repairs, is the equivalent of ten men on a sit-down strike.

Keeping an electric motor "fit as a fiddle and rarin' to go" is a comparatively simple and routine task, and yet a large percentage of motor trouble can be traced to everyday neglect, such as dirt, or improper lubrication. Dust, stray oil, moisture, loose bolts, too much tampering, are the "gremlins" that make life miserable for any farm motor.

Maintenance Rules

Careful inspection should be made more frequently nowadays to keep pace with the increasing load that motors must bear. For example, you should at least once a week:

Examine commutator and brushes, starter, switch and other controls.

Check oil level in bearings.

See that the motor turns over freely. Then every six months:

Clean motor thoroughly

Check brushes for wear

Drain, wash, and renew oil

Tighten connections, bolts, etc.

And once a year:

Clean out and renew grease in bearings

Check air gap

Inspect commutator and armature coils

Ordinary every day care, in addition to periodic inspection, calls for fighting:

1. Dust. Wipe off the motor and occasionally blow out with compressed air.

2. Moisture. Keeping motors dry is as important as keeping powder dry—unless you have a splash proof model.

3. Excess oil. Lubricate to reach inside the bearings. Anywhere else, oil is poison.

Finally, nip trouble in the bud before it happens. Track down the cause for such symptoms as sparking, squeaking, heating, and vibration. Attention to these details in the maintenance of electric motors is one of the answers to continued wartime food production.

Brooders

Chicks chilled mean chicks killed!

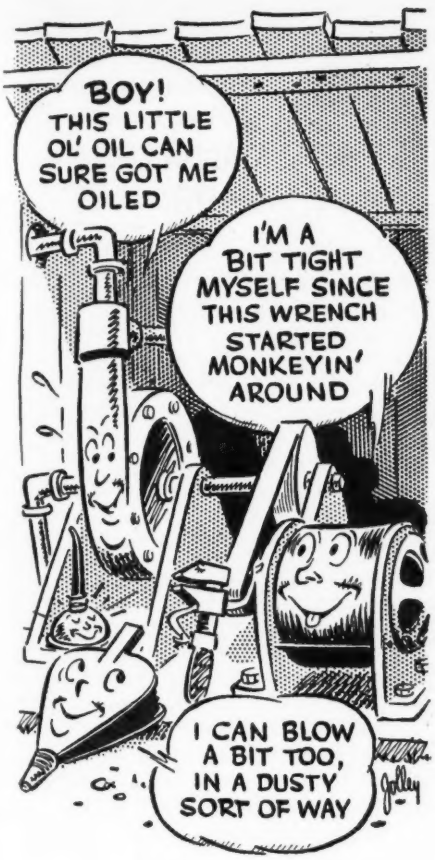
Many a poultryman has learned by sad experience that few chicks can survive a cold night with the brooder functioning improperly. Our 1943 wartime edition of old mother hen—the electric brooder—has the task of rearing more than 13,000,000 baby chicks on California farms this year, or half the total number raised for meat and eggs.

How many chicks will fail to "make the grade" because the thermostat got clogged with dust and litter? How many heating elements will be burnt out by connecting brooders to the wrong voltage? After the spring hatch is over, how many brooders will be set aside carelessly to be used as a roost for the older birds, for the family cow to step on, or the flivver to bump into? Will any man in our armed forces go hungry as a result of poultry farmer negligence?

Poultrymen have the answers to these and other questions. They're learning that proper care of their equipment not only boosts food production, but farm income as well.

A successful chicken farmer will try out his brooder several days in advance, see that the thermostat responds properly at the hottest time of day or the lowest temperature just before dawn.

Indoor brooders should be sus-


BOY! THIS LITTLE OL' OIL CAN SURE GOT ME OILED
I'M A BIT TIGHT MYSELF SINCE THIS WRENCH STARTED MONKEYIN' AROUND
I CAN BLOW A BIT TOO, IN A DUSTY SORT OF WAY

pended securely. Watch for frayed, or rotten ropes, or rusty wires. Outdoor electric brooders are becoming increasingly popular in California, are simple to operate, and to keep clean. Homemade brooders for back yard flocks, or emergency use when regular brooders fail, can be made with electric light bulbs as a source of heat. Whatever the type of brooder, a constant source of even heat is most important. Electricity will provide this source if poultrymen will do their share. This means being ever on the lookout for blown fuses, broken circuit wires, overaged heating coils, and faulty thermostats.

Finally, when not in use, the brooder should be thoroughly examined, "dry cleaned" and stored away—out of reach of laying flock and animals—and ready for the next brood. The thousands of electrical "Biddies" now serving the poultry industry and the war, will carry on for the duration if their owners will only give them fair treatment.

Machines

Electrical machines find more extensive use on a dairy ranch than on any other. Without them production of one of our most vital war foods would be slowed down to a walk. Electrically-operated feed grinders, ensilage cutters, milkers, coolers, sterilizers, refrigerators, butter churns, cream separators, barn and yard lights,—yes, and even electric fly traps—keep dairy workers and cows contented and productive from the 'wee hours' before dawn until long past sunset. To turn out some 600 million gallons of milk this year, as they did last year, dairymen will need to give better than prewar attention to their electrical equipment.

Electric Milkers

The milking machine, for example, has suddenly developed new and added importance in view of the farm manpower shortage. When not in use its motor, pump and rubber parts should be kept in a clean, dry place, away from hay and feed dust. Cleanliness may avoid a breakdown.

Proper cooling of milk is just as important as the proper sterilization of dairy utensils such as cans, bottles, milkers, etc. Electric coolers and sterilizers can do these two dairy ranch jobs very effectively. But again, the successful battle to keep the bacteria count down and the production of 'Grade A Raw' or 'Pasteurized' up depends entirely on the uninterrupted functioning of these machines. Dairy operators are prone to leave sterilizers running unattended. With a thermostat, time switch or water level control this is not too serious, but with non-automatic equipment it's courting disaster.

Sterilizers

A few pointers on the proper care of sterilizer boxes and steam accumulators would include:

Locate the switch so that the operator won't be "shocked" when he forgets to take his other hand out of the wash water.

Do not allow water to boil away, even if there is a thermostat.

Clean the scale off the heating elements periodically.

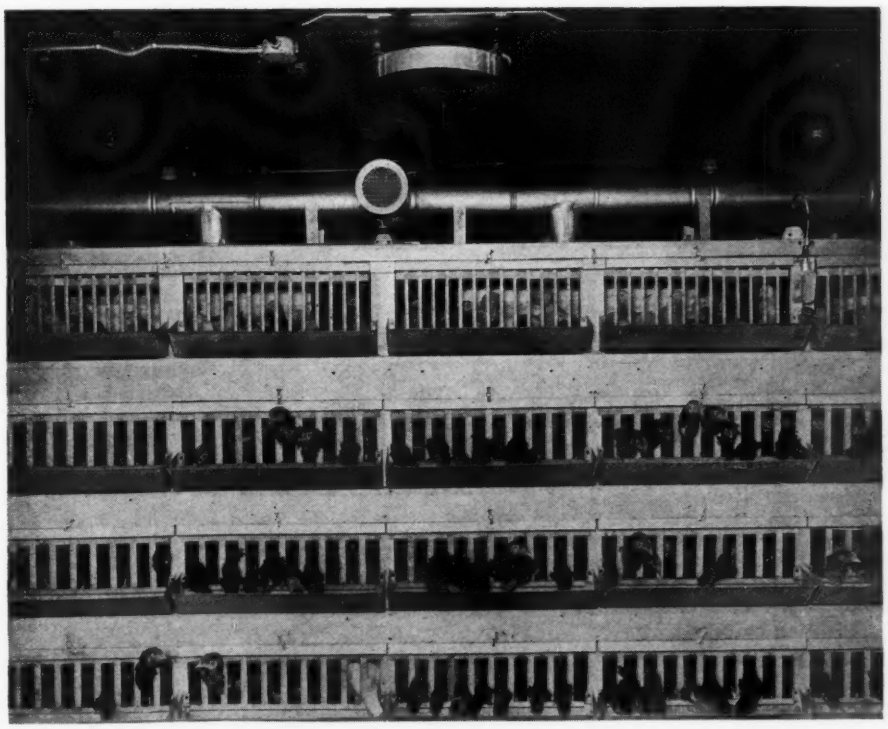
Drain out and allow sterilizer tank to dry when not in use. This will reduce corrosion.

Free the steam boiler of scale and sludge and refill with fresh water occasionally.

Pop the safety valve once a day.

Check the thermostat—if there is one—see that the parts work freely.

Poultry raising has been intensified both because of rationing of other meats and because of the need for more eggs. Production on the Pacific Coast has been increased 15 to 18%. Modern electric techniques play an important role in making these increases possible. In the production of meat birds the battery brooder constitutes a regular "chicken factory." Electrically heated brooders reduce chick mortality and insure heavier, healthier birds. Here is a battery brooder set-up perfected by the farm electrification laboratory of the Puget Sound Power & Light Co. which not only is electrically heated but includes forced ventilation and air conditioning as well. This insures perfect temperature and atmosphere control with resultant beneficial effects on the birds



NEWS of the industry

PUBLIC WORKS CUSHION SLATED FOR THE WEST

Plans for the construction of 79 or more irrigation and multiple purpose projects to constitute a giant postwar public works program in the 17 Western states have been prepared by the Bureau of Reclamation. Existence of this program aimed at cushioning the shock of demobilization of service men and emergency war workers was revealed by Walker R. Young, assistant chief engineer of the bureau.

The bureau proposes to complete work on 25 projects on which construction has been halted or retarded by the WPB and to begin construction on four large projects which have been authorized but on which work has been deferred due to war conditions. In addition there is a shelf of 50 projects, principally irrigation, for which blueprints have been prepared and on which work can be started at short notice.

Completion of power installations which have been cleared by the WPB will bring the capacity of existing bureau plants up to 2½ million kilowatts. On uncompleted and new projects of the postwar program, more than three million additional kilowatts will be installed when the market justifies the outlay, according to Walker.

125,000 Sign Petition To Put PUD Initiative Before Voters

Filing of 125,000 signatures, more than four times the required number, assures that Initiative No. 12, a bill granting wide and unrestricted powers to Washington PUDs, will go before the people of that state for final decision in the 1944 general election. The referendum petitions carried twice as many signatures as the original initiative to the legislature.

The 125,000 signatures were secured by volunteer workers in only 79 days from the date that the state supreme court unanimously ruled that the bill was subject to referendum.

Commenting on the filing, Kinsey M. Robinson, chairman of the referendum committee, pointed out that signatures not only came from the populous Puget Sound region but that strong support was marshalled in the agricultural counties east of the mountains. "This is pretty good proof that support of Initiative No. 12 by the left-wing minority of the Grange does not represent the views of the majority of the farmers of the state," he said. "We also greatly appreciate the support given the committee by organized labor in the state. Many labor groups realize that state socialism, carried to its logical conclusion, means the destruction of organized labor, and the energetic work of laboring people in securing signatures played an important part in bringing the bill to a vote of the people."

Initiative No. 12 would have allowed two or more PUDs to create a super-PUD to take over electric systems and issue millions of dollars in bonds, simply by resolution of the commissioners and without a vote of the people. It went to the Washington legislature with the bare minimum of signatures required for an initiative and was passed by a narrow margin. The state senate subsequently voted to refer the bill to the people, but the resolution to refer was shelved in the house.

Los Angeles Plant Begins Production of Buna S

Production of government specification Buna S synthetic rubber began last month in a new $15,000,000 polymerization plant in the Los Angeles harbor district. The new plant was financed by the Defense Plant Corp. and is being operated for the Rubber Reserve Co., a division of RFC, jointly by the U. S. Rubber Co. and the Goodyear Tire and Rubber Co. The pooling of resources and personnel on the two strong competitors in a company known as the California Synthetic Rubber Corp., is unique in the annals of the American rubber industry.

The new production operation has an ultimate annual output of 90,000 tons and it integrates the polymerization step with other southern California plants producing butadiene and styrene. These latter facilities are also government owned. The main plant for finished butadiene will be operated by the Shell Chemical Co. with the raw stocks coming from a plant of the Southern California Gas Co. A plant recently converted by Standard of California will also supply a large amount of the finished butadiene. The styrene plant is operated by the Dow Chemical Co.

● A FOURTH UNIT bringing the plant to its ultimate capacity of more than 115,000 kw. went into service in the Parker Dam plant on the Colorado River last month.

RAVER ASKS ADDITIONAL STORAGE FACILITIES

Potential 1945 power shortages are in store for the Pacific Northwest unless additional storage facilities are provided on the Columbia River for firming up the Bonneville and Grand Coulee plants, according to Dr. Paul J. Raver, Bonneville power administrator. Approximately 3,000,000 acre-ft. of additional storage is required.

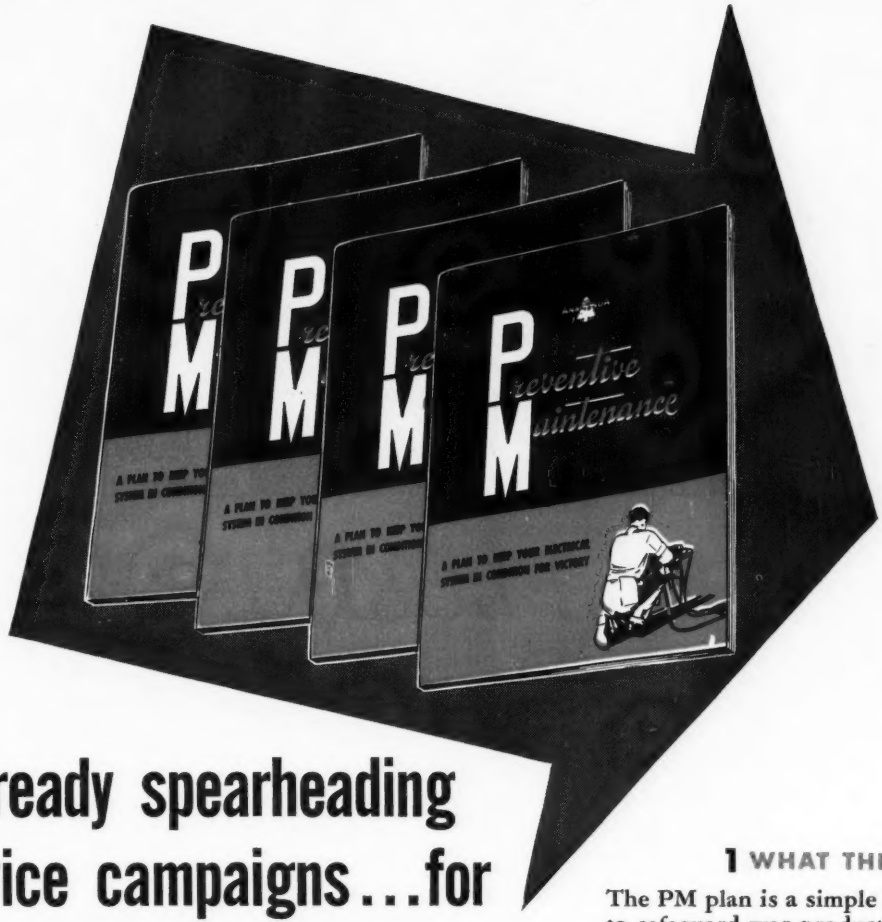
Reviewing the Bonneville-Grand Coulee power situation Dr. Raver stated that Army engineers will soon complete the addition of 6 ft. to the height of the Bonneville dam, thus firming up the present installation of seven generators. No. 8 machine will be ready in August and Nos. 9 and 10 in January, thus completing the project. Five generators are in service at Grand Coulee including the two 75,000-kw. units transferred from Shasta Dam. Another 108,000-kw. unit is to be ready in August, a second in December and a third in March, 1944, thus temporarily completing the installation in one power house.

The Bonneville advisory board has urged additional water storage as a substitute for more generators and Army engineers are investigating several possibilities. The two most important are Albeni Falls on the Clark Fork River in northern Idaho and Flathead Lake in western Montana. Both projects have aroused intense opposition based principally on the issue of states rights. Each of the projects would flood valuable farm lands.

Central Valley Funds Up For Committee Debate

House and Senate conference committees had before them for reconciliation as this issue went to press an Interior Department appropriation bill in which the former set up $11,500,000 for the Central Valley project for fiscal 1944 as compared with a Senate grant of $28,700,000. Principal differences involved construction of transmission lines from Shasta Dam and extension of the canal systems in the San Joaquin Valley.

The House bill appropriated only sufficient funds for the construction of a 25-mile transmission hookup from Shasta Dam to the Shasta substation of Pacific Gas and Electric Co. In the Senate bill an additional $1,000,000 was appropriated to build a line from Shasta Dam to Oroville.



Already spearheading service campaigns...for more than 40 Utilities

THE PM PLAN

Introduced a short time ago, Anaconda's Preventive Maintenance Plan is being widely used by utilities to help customers keep electrical systems operating *efficiently*—despite shortages in essential wiring equipment.

Already some 40 utilities are actively engaged in this program. With it, they are helping their industrial power customers maintain continuous wartime production by preventing electrical breakdowns.

1 WHAT THE PLAN IS

The PM plan is a simple but comprehensive way to safeguard war production by preventing electrical breakdowns *before they develop.*

2 HOW IT WORKS

The plan provides a practical means of making periodic, systematic analysis of circuits and equipment. Uncovers potential weaknesses . . . suggests ways to correct them . . . prevents overloading of lines.

Data thus gathered aids local W.P.B. Branches in reaching decisions on requests for materials to *prevent* breakdowns.

3 HOW UTILITIES BENEFIT

The PM plan helps utilities maintain close customer contact despite a lack of "something to sell." Offers basis for service campaign that definitely appeals to customers. Puts the utility in a leadership role for furthering war production throughout the area it serves.

If you aren't already utilizing the Anaconda Preventive Maintenance Plan, mail the coupon for full details.

43234

"Tomorrow may be too late . . . do it today!"

ANACONDA'S PREVENTIVE MAINTENANCE PLAN

Anaconda Wire & Cable Company
25 Broadway, New York City

Please send copy of the Anaconda Preventive Maintenance Plan for safeguarding wartime production.

Individual .....

Company .....

Address ..... City .....

7K

This
NEWSPAPER
advertisement was published in Washington, New York and Chicago by McGraw-Hill, to make friends for business.
BLANK MFG. CO. 1939
50 JOBS
BLANK MFG. CO. 1943
250 JOBS
BLANK MFG. CO. POST-WAR
HOW MANY JOBS?

"LITTLE BUSINESS" needs Seed Money most of all

Every Business needs Friendly Neighbors

If you want your business to operate in a favorable environment in the post-war world, you must have "friendly neighbors." That means that people must be conscious of the fact that they are directly affected by your success or failure.

The simple, direct solution to this public relations problem of industry is for each company to use the newspapers of the city in which its plant is located, to create a better understanding of the economic life of that community.

Through these Seed Money advertisements, we are explaining the advantages of the profit-motive to every American. This is being done in newspapers in Washington, New York and Chicago and in our own 22 publications.

But all of the people in every manufacturing center in the United States should be getting these or comparable messages.

We will gladly furnish you a free mat if you want to join the many companies who are doing a basic public relations job by running this Seed Money series in their local newspapers.

James H. McGraw, Jr.
President

McGraw-Hill Publishing Company, Inc.

ONE of the easiest things for you to understand, and one of the hardest things for government to understand is "Little Business."

Little Business lives right around the corner from you . . . He's the garage man who has pooled his lathe with the lathes of other garage men and opened a factory to turn out war materials . . . He's the machinist who has scraped up some second-hand equipment, hired some other machinists and turned an empty building into a source for bomb-rack parts . . . He's the boat yard owner who has parlayed a little knowledge and a lot of guts into a fleet of subchasers . . . Maybe he is one of the 21,000 sub-contractors who are helping just one large manufacturer (International Harvester Co.) fulfill his war contract.

Everybody knows Little Business because everybody meets businessmen everywhere they go.

Three cheers for Little Business, because—through courage, resourcefulness, and unlimited hours of work, businessmen are helping to win this war.

But, before you join in the cheers, take thought of what we said in the first paragraph: it is hard for *government* to understand Little Business.

You can do something more effective for Little Business than giving him the empty reward of your applause.

You can help him survive when the war is over.

And don't think it is not VITAL to you that the millions of hustling, adventurous souls who constitute the army of "Little Business" do survive.

The "take a chance" spirit of businessmen is the spark that has made America a great nation.

► Every time a businessman succeeds he makes jobs for other men and women. Every time that happens

FREE MATS: If you would like to publish this message over your own company name, or distribute it in handy booklet form, write or wire: Research Dept., McGraw-Hill Publishing Co., Inc., 330 West 42nd St., New York (18), N.Y.

"LITTLE BUSINESS" needs Seed Money most of all (cont'd)

there is more real wealth available for Americans. Multiply that by the millions of Little Businessmen and it's easy to see why it is vital that they survive.

Bear in mind that we haven't said government doesn't want Little Business to survive. Government loves Little Business. All government people get a tender light in their eyes when they speak of the Little Businessman.

But government is handicapped. It wants to help the Little Businessman, but it doesn't know how, because it does not understand the motives and rewards of business adventure.

Business is "profit-minded." That's why it is so hard for government to understand it.

Government should try to understand the profit-motive, because out of profit comes the Seed Money that creates still more jobs. Businessmen lay aside a part of their profits to be used for future development. This is called Seed Money.

Seed Money is not personal profit. It is used to develop new methods and to buy new machines that do more work in less time. These improved machines make higher wages and lower prices possible. In turn, improved machines yield still more Seed Money and the process grows in an ever widening circle. We call the result a "high standard of living."

► With this wonderful, automatic encourager of human endeavor (profit) at its command, wouldn't you think government would say "Swell, here's the device that will make jobs for everybody after the war, pay off the war debt and raise our standard of living still higher. Let's put Seed Money to work harder than ever before."

Does government say this? No, you know it doesn't. Instead, Government regards business profit merely as a source of tax money. It withers progress and improvement for all Americans by draining off the business profits that would create new jobs when the war is over.

Little Business is hit hardest of all.

Generally, a small business has no record of high profits in the years before the war. Therefore, in the eyes of government, most of the profits such a company makes is "Excess Profit" and is taken away in taxes.

What will Little Business do when the war is over? Will he hire his share of returning soldiers, and out-of-work government people, as well as keep the people who are working for him now?

To do that, he will need the best machinery; he must pay for improvement of his products, and finance the distribution and sale of those products.

He'll have the brains and courage for all that, but he won't have the money.

But there are millions of Little Businessmen. They will get together. They and their friends will bombard Congress. Another government bureau will be set up.

► Government money will be loaned. But a funny thing will happen. Little Business will not be free to "take a chance" with this money, because it belongs to the government. But "taking a chance" is the life breath of all business, especially Little Business. There will be a penalty on courage.

You, dear reader, whether you are a bureaucrat, business or professional man, farmer or laborer, can't afford to let that happen to the venturesome business spirit that sustains our national life.

You can do something about it, too. You can help spread the knowledge everywhere that production in war and good living in peace depend upon healthy, constantly improving business and industry. You can be against monopoly and still know that Big Business really exists to serve the millions of men who are Little Business, and depends upon them for its own existence.

You can believe in social reform, and still see that it's one thing to kill the weeds in our Industrial Victory Garden and another to attack the crop.

You can tell your Congressman that the most practical post-war planning he can do is to help in framing laws that will create a favorable environment for business in the post-war world.

"Industrial Progress is the Source of all Good Living."

THE McGRAW-HILL NETWORK OF INDUSTRIAL COMMUNICATION

22 publications, which gather "war-news" from the "war-production-front" through a staff of 153 editors and 725 engineer-correspondents . . . More than 1,500,000 executives, designers, production men and distributors use the editorial and advertising pages of these magazines to exchange ideas on war-production problems.

McGRAW-HILL BOOKS

Publishers of technical, engineering and business books for colleges, schools, and for business and industrial use.

This advertisement is available in handy booklet form. (Less than 100 copies free. Larger quantities, $1.00 per 100; $10.00 per 1000.)

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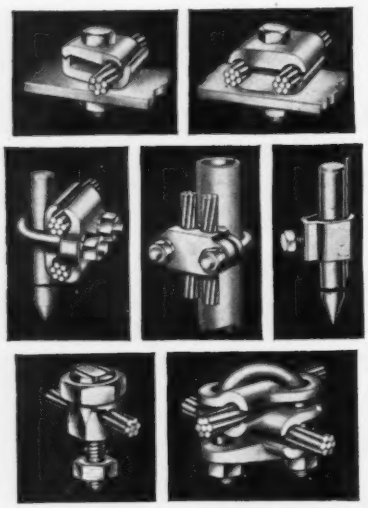
"You can get ANY Grounding Connector—

—in the COMPLETE line."

The pictures below can only give you an idea of the variety, because **Penn-Union makes ALL good types.**

Write us for any grounding connector, clamp or stud . . . for all combinations of pipe, rod, flat bar, cable, braid, tubing.

Every one a *dependable* unit of protection for personnel and equipment . . . of ample capacity, high mechanical strength, and resistant to corrosion.



Also the most complete line of Service Connectors, Cable Taps, Terminal Lugs, Tees, and other fittings.

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PENN-UNION
Conductor Fittings

PROBE OF GOVERNMENT POWER PLANTS ASKED

A resolution by Sen. Ernest W. McFarland, Arizona Democrat, for an investigation of government-owned hydroelectric generating stations has been approved by the Senate. The investigation probably will be made by a five-man subcommittee of the Interstate Commerce Committee.

Sen. Burton K. Wheeler, Montana Democrat and chairman of the Interstate Commerce Committee, had not appointed the committee as this issue went to press. Sen. McFarland's office knew of no proposals to enlarge the scope of the investigation beyond the local situation in Arizona, to study which McFarland introduced the resolution.

Only change made in the resolution by the Senate was a reduction from $5,000 to $3,000 of the sum available for investigation expenses. Sen. Homer T. Bone, Washington Democrat, said there seemed to be little reason for the investigation unless it was aimed at furthering hydro developments in the western United States, adding:

"If the desire is to develop more power, I shall be delighted to see the committee take some action which would stimulate production and more generating equipment at Grand Coulee."

McFarland's resolution calls for "complete study and investigation" of:

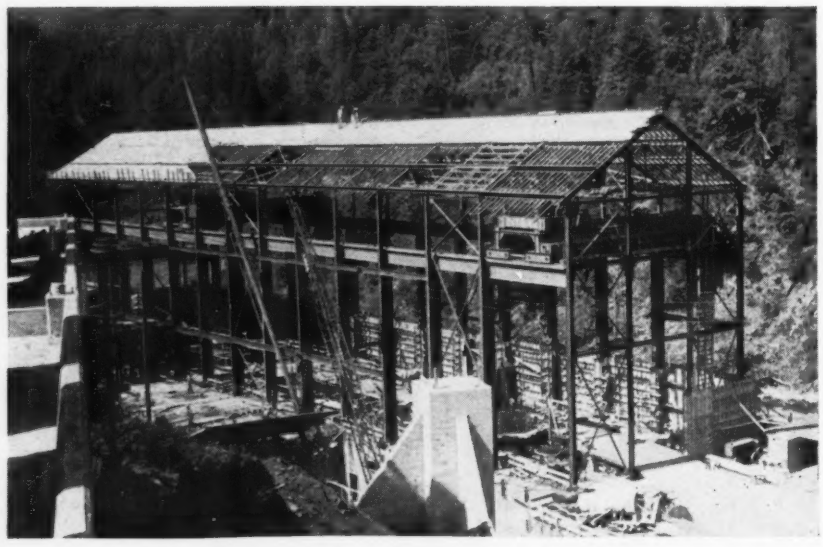
1. Adequacy of the supply of hydroelectric power generated in government plants.
2. Whether such supply is properly allocated and distributed for war and civilian purposes.
3. Whether the distribution of such supply is made under proper conditions and safeguards.
4. The relation between generation of hydroelectric power at government plants and irrigation.
5. Whether plans for future development of government hydroelectric plants provide for full utilization of such facilities in development of both electric power and irrigation.

Electric Utilities Go on Air With New Program

Report to the Nation, a dramatic half-hour presentation of the week's outstanding news, will be sponsored by the operating electric utilities advertising campaign, which up to now has been confined to national magazines. The program will be aired over all stations of the Columbia Broadcasting System commencing July 27 at 9:30 p.m. EWT. It will be a regular Tuesday evening feature after that date.

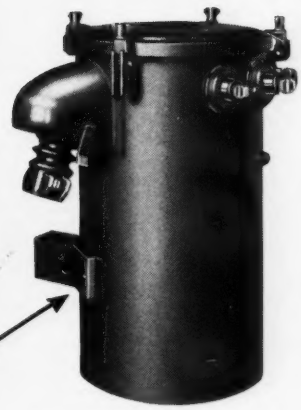
According to N. W. Ayer & Son, the advertising agency for the account, the group of companies now cooperating in the program has increased from the initial 52 to 121 at the present time. The radio program was a former Columbia system sustaining show carried Sunday evenings at 10:30 EWT.

● BOULDER DAM power house became the first station in the world to operate at more than 1,000,000 kw. capacity on June 11. An all-time high load was carried on that day.

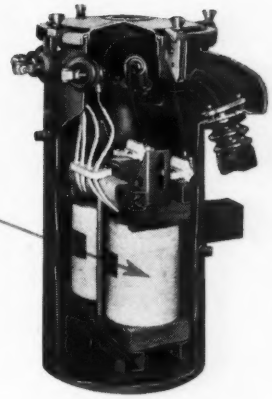


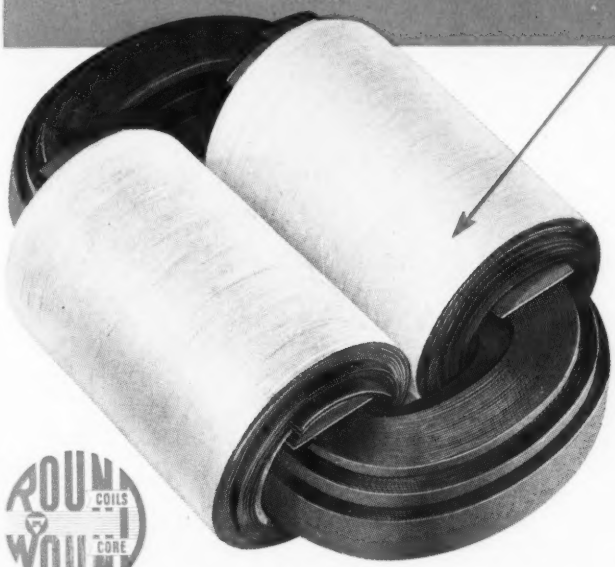
Steelwork rises at PG and E's Pit No. 5 project on the Pitt River in northern California. In the background is the power house, where four 4,000-kva. units are being installed. Work is scheduled for completion late in 1943

from the outside the L-M ROUND-WOUND looks the same as other transformers...



but its PERFORMANCE cannot be duplicated!





Compare an L-M ROUND-WOUND Transformer with any other of equal rating. From the outside they look much the same — most transformers are built to E. E. I.-NEMA standards as far as bushing arrangement, mounting and other features of the tank are concerned — but there the similarity ends.

The L-M ROUND-WOUND gives you more desirable features than any other transformer. Higher short-time overload capacity, uniformly higher impulse strength and high mechanical resistance to short circuits are inherent advantages of this transformer.

It is natural that the ROUND-WOUND has higher short-time overload capacity. The two long, round coils readily dissipate heat because they are almost completely in contact with free oil.

Uniformly higher impulse strength is a result of the round shape of the coils. In winding, all sharp bends and strains in the wire are eliminated. Also eliminated, is the tapping mallet, which so often causes damage to the wire and insulation in conventional coil winding.

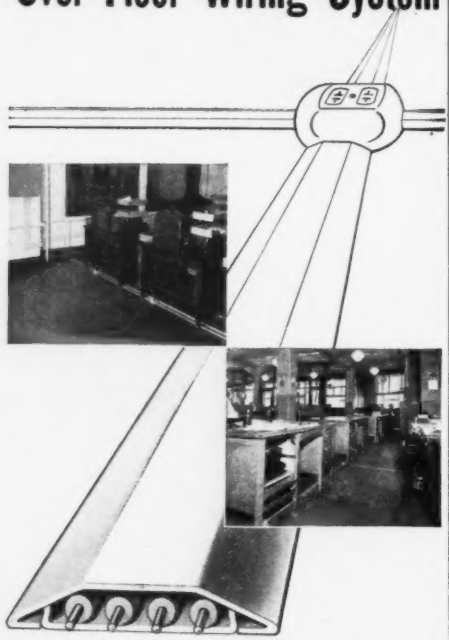
The L-M ROUND-WOUND is mechanically stronger to better withstand short circuit conditions without damage. Short circuits tend to form coils into a round shape. By having round coils to start with, the ROUND-WOUND is not subjected to the strains which short circuit conditions impose.

Regardless of the tank you put it in, the L-M ROUND-WOUND will still give you more desirable features than any other distribution transformer. ROUND-WOUND is available in 1½ to 25 Kva. 2400 to 7620 volt ratings.

LM

LINE MATERIAL COMPANY

PANCAKE
WIREMOLD
Over-Floor Wiring System



Safe, Simple, Flexible . . .
for PLANT or OFFICE

● Pancake Wiremold is the most logical and economical way to take care of extension or relocation of electric wiring to desks, machines, etc., in factory working areas and offices that are "cramped for space".

This safe, simple, easily installed Over-floor Wiring System solves problems of this kind with minimum use of critical materials . . . without channeling of floors or breaking into plaster of walls . . . without, in most cases, disturbing people at work. Pancake is neat, unobtrusive in appearance . . . "flat as a pancake; strong as a bridge"; trip-proof and crush-proof.

Fittings for telephone, light or power service connections and for interconnections to existing wiring or other Wiremold Raceways. Available from stock on suitable priority for essential industry needs. Conforms to Federal Specification W-R-32. Listed by U. L.

Write for detailed new bulletin to The Wiremold Company, Dept. EW 7, Hartford 10, Connecticut.

WIREMOLD
CAN HELP YOU PRODUCE FOR WAR . . .
AND PLAN FOR PEACE!

BILL WOULD PUT POWER AGENCIES UNDER ONE HEAD

Based on his belief that "public power is here to stay," Rep. Everett M. Dirksen, Illinois Republican, has introduced legislation to combine under an Office of Power Administration all federal agencies dealing with the planning for generation, marketing, distribution, control and financing of electric power, and with the regulation of electric utilities.

Dirksen told the House such legislation is necessary because the federal government, with a $2,000,000,000 investment in public power projects, is appropriating "something in excess of $300,000,000 yearly on power projects. . . ." These funds, Dirksen pointed out, are made available to a multiplicity of agencies dealing with various phases of the power program, adding:

"The thing to do is to coordinate these activities wherever possible that we may more intelligently legislate and appropriate in this field."

Dirksen's bill (H.R. 2754, referred to the committee on Interstate and Foreign Commerce), would:

1. Establish an Independent Office of Power Administration under a Federal Power Administrator appointed by the President, subject to Senate confirmation, to a four-year term at $10,000 yearly. The administrator may have no connection with any electric utility, nor may he own stock in such company.

2. Consolidate the Bonneville Power Administration, Rural Electrification Administration, Tennessee Valley Authority and Federal Power Commission in the new office, transferring thereto all personnel and functions. Only exception would be to allow FPC to exercise independently its rate regulation, investigation and adjudication functions.

3. Transfer to the new agency all functions of the Reconstruction Finance and Defense Plant corporations relating to power loans, all functions of the Securities and Exchange Commission relating to electric utility regulation, all functions of the Federal Works Agency relating to construction and operation of electric power projects, and all functions of the Bureau of Reclamation relating to the production and marketing of electric power.

4. Establish a Federal Power Advisory Committee composed of the Chief of Engineers, U.S.A., Commissioner of Reclamation, Bonneville Power Administrator, Rural Electrification Administrator, chairman of the Reconstruction Finance Corp., Federal Works Administrator, chairman of the Federal Power Commission, chairman of the Securities and Exchange Commission and chairman of the Tennessee Valley Authority. The committee would be charged with development of "a coordinated national power policy in the interest of national defense as well as of peacetime needs."

5. Abolish the National Power Policy Committee and the Division of Power, both of the Interior Department, transferring their functions to the new agency.

6. Make it the duty of the advisory committee to advise other governmental agencies on power matters when requested to do so, and declare it in the public interest for the Office of Indian Affairs, the National Park Service, Army-Navy Munitions Board, Office of War Utilities and any other government agency concerned with electric power to consult with the new agency on power matters.

In addition, the Dirksen bill would transfer to the new agency all appropriations, funds or allotments to agencies consolidated into it, and as much of the unexpended balances now available to consolidated agencies as the Budget Director might direct.

Laws and regulations relating to any agency or function transferred to or consolidated with the Office of Power Administration would remain in full force as far as they are consistent with the Dirksen act. Court actions filed under these laws or regulations would not be affected.

Green Mountain Dam to Get Second Generating Unit

A second 10,000-kw. generator is about to go on the line at the power plant of the Green Mountain Dam of the Colorado-Big Thompson reclamation project, Interior Secretary Harold L. Ickes has announced.

Output of the new unit will be distributed principally by the Public Service Co. of Colorado until the end of the war. It will serve Denver and other areas with expanding war industries.

All construction on the Colorado-Big Thompson project except the Green Mountain Dam and power plant was halted last fall when WPB stopped construction of many public and private projects.

● Puget Sound Power & Light Co.'s reorganization plan whereby Engineers Public Service Co. relinquishes control of the property to the preferred stockholders has been approved in the U. S. district court in Boston. The plan, previously approved by SEC, becomes effective Sept. 13, 1943.

MILLER DOES IT AGAIN!

STUDY CAREFULLY *the details of the MILLER patented Safety Lamp Lock as shown at the right. It is an integral part of each socket—prevents lamps from falling.*

There are several highly significant features of the new MILLER Aero-Designed fluorescent fixture, and its compliance with WPB regulations limiting the use of steel.

Of all features, none is more noteworthy than the MILLER Safety Lamp Lock. The vital spots where it gets in its good work are shown in the circled sockets in the continuous run of fixtures at the top of the page, with the details diagramed immediately above.

It is an extremely important feature to you . . . because it minimizes the risk of lamps falling from sockets. Fool-proof under all conditions, it can mean the saving of time and money in your busy plant . . . yes, the prevention of dangerous accidents, too.

This Safety Lamp Lock is *exclusive* with MILLER. It's a product detail that undoubtedly is one of the best available demonstrations of the constant alertness of MILLER lighting engineers in your interest. It's your best reason for calling in a MILLER field engineer (located in principal cities) today, to talk more about this Aero-Designed fluorescent lighting, and how it can help you.

Other Noteworthy features

FLANGED TOP CHANNEL *simplifies installation—saves labor.*

"EXTRA LENGTH" REFLECTORS—*shield lamp ends—of sturdy Masonite with reinforcing attachment straps.*

IVANITE *the "sealed-in-surface" finish—durable, easy to clean, high reflection factor.*

STREAMLINED—*completely wired channel with exposed ballast for heat dissipation.*

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Jeffries Transformers

Reasonable in Price
Reliable in Performance

Jeffries large transformers are priced reasonably—and you can save their first cost in a short time by minimizing current losses. When you use a Jeffries transformer, you can provide voltage change at the point desired, without prohibitive expense.

We supply all types and sizes. If not in stock, we build to order in a hurry—a week to 10 days.

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Carbon Products

Multiflex Brushes
Give Better
Commutation,
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STEAM PLANT ADDS POWER FACILITIES IN SOUTH

Power generating facilities in southern California were augmented June 17 when a new 65,000-kw. turbo-generator in the Harbor Steam Plant of the Los Angeles Bureau of Power & Light was dedicated. The unit, rated at 3,600 rpm., 915°, 1,050 psi, 13.8 kv., 60 cycles, is the largest of its type ever built. It is a Westinghouse machine.

Features of the machine include stream line design, hydrogen cooling, special earthquake protection and instantaneous load pickup. Either natural gas or fuel oil can be burned under the single boiler. On the basis of full operation, approximately 800,000 bbl. of fuel oil a year would be consumed. Boiler rating is 675,000 lb. per hr. Condensers use sea water for cooling. Twin concrete conduits 8 ft. in diameter and 1,000 ft. long bring the cooling water from the harbor channels. A second pair of conduits discharges the water into another channel.

There are no exposed high or low voltage conductors in the plant. Oil-filled 132-kv. underground cables are used to conduct the energy from the plant to Receiving Station "C" two miles north. The transformer bank is rated 66,000 kw. with natural ventilation and 90,000 kw. with forced-air cooling. The station is laid out for an ultimate installation of 300,000 kw. The initial installation cost $9,000,000. Plant efficiency is 11,400 Btu per kwh. of net station output.

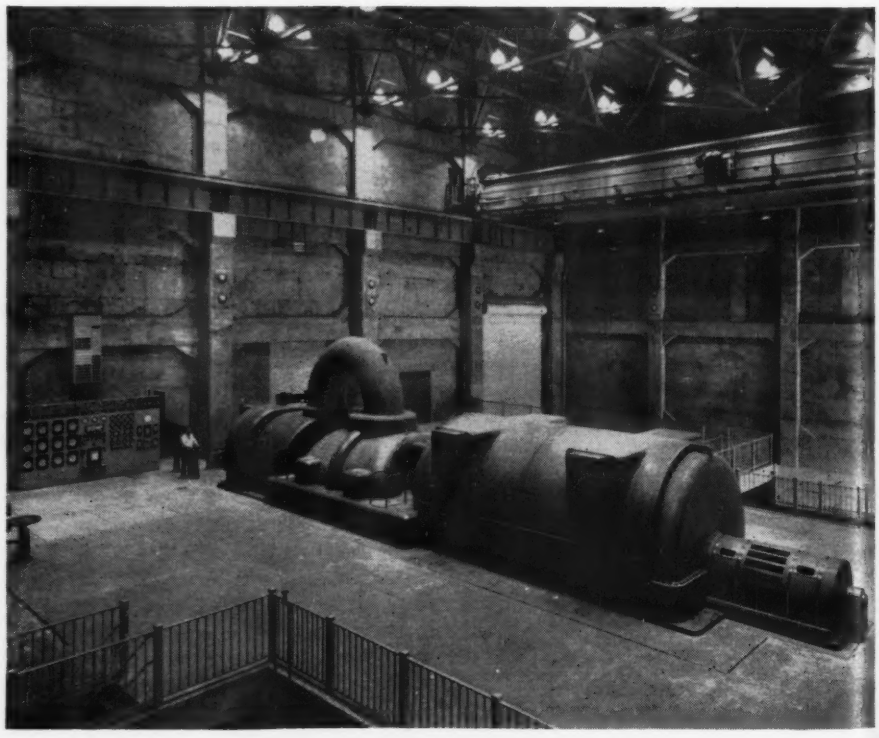
● WESTERN PROJECTS were included in REA allocations announced last month by Administrator Harry Slattery. In California, Redwood Electric Coop, Garberville, received $200,000. Grants in Colorado included $280,000 to the Empire Electric Assn., Dove Creek, and $8,000 to the San Isabel Electric Assn., Pueblo. Umatilla Electric Coop, Hermiston Ore., received $10,000; and another $10,000 went to Central Electric Coop at Redmond, Ore. Okanogan County Electric Coop., Winthrop, Wash. was allotted $5,000 and Moon Lake Electric Assn. at Mt. Emmons, Utah, $10,000.

● TRANSFER OF PROPERTIES of the Western Colorado Power Co., including 28 certificates of public convenience to the Utah Power & Light Co. has been approved by the Colorado Public Utilities Commission. The transfer is part of a corporate simplification plan in which Utah Power & Light is absorbing subsidiaries and thus stepping out of the holding company category.

● GENERATORS in the 10,000-kw. Swan Falls plant of the Idaho Power Co. on the Snake River were flooded and filled with mud when a 70-ft. earth-filled dam on tributary Sinker Creek failed and released 2,700 acre-ft. of water on the night of June 19.

● ACCOUNTING ADJUSTMENTS totaling $11,603,081 have been ordered by the Federal Power Commission in its original cost study of the Idaho Power Co.

Here is the 65,000-kw. turbo-generator at the new Harbor plant of the Los Angeles Bureau of Power & Light. It is the largest machine of its type ever built



VICTORIA HAS PLAN FOR POSTWAR LIGHTING

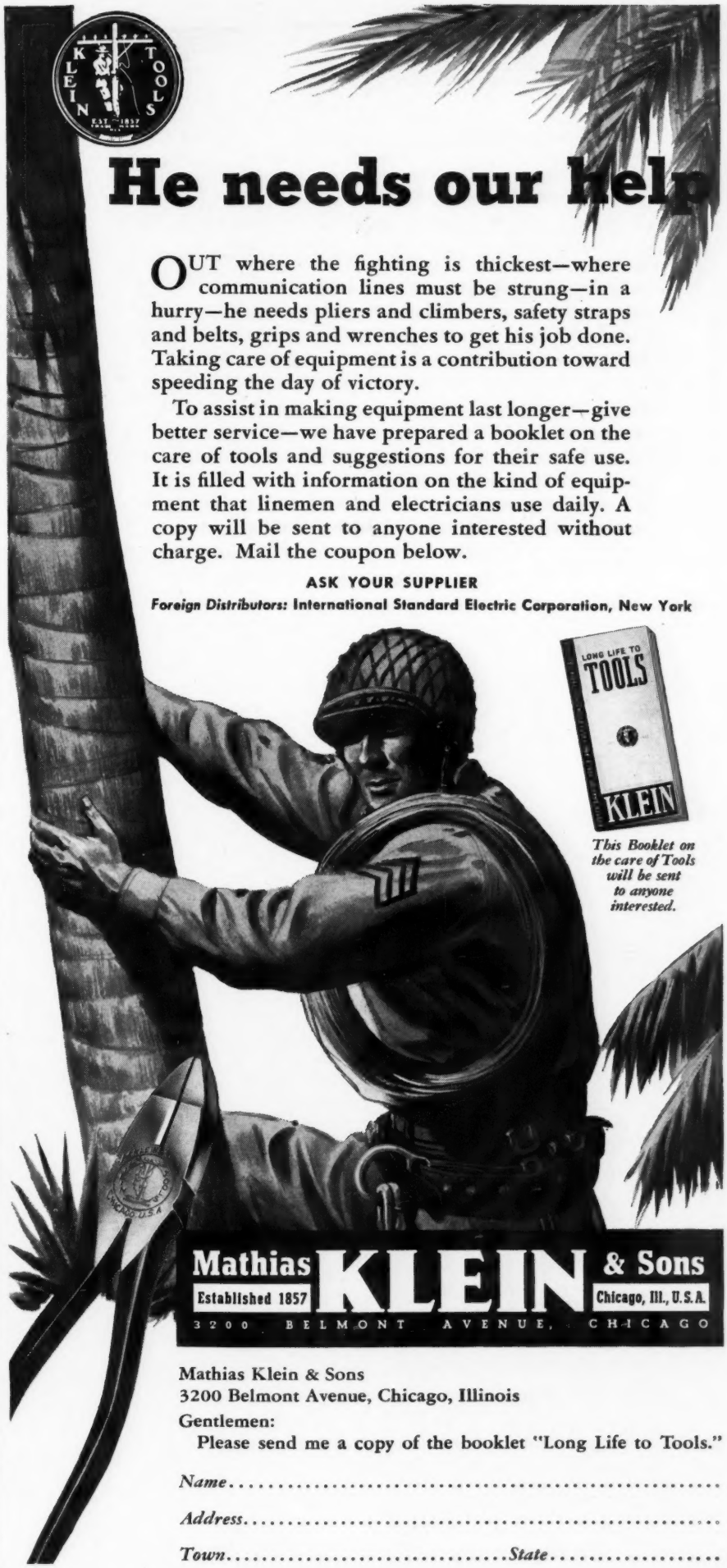
Launching of an ambitious program costing approximately $200,000 for postwar rehabilitation of the street lighting system at Victoria, B. C., was approved by the city lights committee there recently.

The projects listed were drawn up "to facilitate postwar rehabilitation and to institute a program of much needed and long overdue replacements and improvements to the services under the jurisdiction of the Victoria city street lighting department," the report said in part.

Items covered in the proposed program included renewal and replacement of underground primary and secondary cables and increasing the capacity of underground transformers in the downtown cluster lighting system at a cost of $120,000; rearranging residential series lighting and installing new material at a cost of $3,600; illuminating four miles of the Marine Drive with sodium lights from Belleville to Foul Bay Rd., using underground cable and ornamental standards, at a cost of $20,000; permanent illumination at Beacon Hill at a cost of $15,000; completion of the installation of all circuit entrances to the substation in the underground cables at a price of $20,500; putting certain Douglas St. wiring underground at a cost of $7,500; and modernizing the business district street lighting by eliminating the five-light clusters, boosting the height of standards six feet and equipping them with modern units at a cost of $12,500.

● Above Normal Runoff in Montana, Idaho and the high Sierras of California, subnormal stream flow in British Columbia, along the coast in northern California, Oregon and Washington and in the Colorado River Basin were reported in the official Water Resources Review for May. Where stream flow was below normal, subnormal precipitation and low temperatures had delayed snow melt. However, many of the rivers draining high snow covered areas were reported rising rapidly at month's end. Levels in key wells were above May 1942.

● As a Result of transportation conservation, exactly 6,998,803 miles were measured on the speedometers of Edison automobiles, trucks and other motor vehicles last year. This was a reduction of 4,968,197 miles from the 1941 total of 11,967,000. The 1942 travel used 768,681 gal. of gasoline—much less than the 1,162,900 gal. used in 1941.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He needs our help
OUT where the fighting is thickest—where communication lines must be strung—in a hurry—he needs pliers and climbers, safety straps and belts, grips and wrenches to get his job done. Taking care of equipment is a contribution toward speeding the day of victory.
To assist in making equipment last longer—give better service—we have prepared a booklet on the care of tools and suggestions for their safe use. It is filled with information on the kind of equipment that linemen and electricians use daily. A copy will be sent to anyone interested without charge. Mail the coupon below.
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Portland, Ore.

COAST SALES CO.
307 Main Street
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STEVENS SALES CO.
41 Post Office Place Salt Lake City, Utah

Because someone thought it sport to tie a wire on a seagull's leg, the bird is dead and a section of Utah went without power for awhile. The bird, with the wire attached to its leg, lighted on a Utah Power & Light Co. power line. Pranks such as this have been numerous lately and the company has initiated a program designed to inform minors of the dangers of such acts

● FEDERAL POWER COMMISSION has released its report of electric rates as of Jan. 1, 1943, in cities with populations of 50,000 or above. The report shows typical monthly bills for residential, commercial light and power, and industrial services in 200 cities served by 153 utilities. Rate reductions in one or more typical bills for residential service were made in 17 of the 200 cities during 1942, as compared with 37 in 1941. Increases in one or more typical bills for residential service were reported in three cities. Tacoma City Light again led the nation's larger cities with lowest residential bills for 40, 100, 250 and 500 kwh.

● EXTENSION of the federal court injunction prohibiting San Francisco from selling Hetch Hetchy Power to the Pacific Gas and Electric Co. has been granted by U. S. District Judge Michael J. Roche. The extension was requested by Public Utilities Manager E. G. Cahill because additional time is required to complete the Riverbank aluminum plant which will ultimately use all of the city's power. One pot line is operating at the present time.

● BI-MONTHLY BILLING for all domestic customers of the Los Angeles Department of Water and Power went into effect July 1.

ALL the strength and durability inherent in steel are combined—with definite economies—in *Crapo* Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.

Ask the distributor of *Crapo* Galvanized Products near you or write direct for further information!

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

Save Time! Save Metals!

TRICO COLORTOP FUSES

● All colored top—color tells the size. Easy selection—quick inspection.

● Non-metallic top saves critical material for war effort.

Insist Upon COLORTOPS!

TRICO FUSE PULLERS

For cheap insurance against accidents, shock, burns, infection, use a TRICO FUSE PULLER. Install them on all jobs.

Write for Bulletin No. 5

COAST REPRESENTATIVES
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H. H. Van Luven, 307 E. 3rd St., Los Angeles
Albert S. Knight, 3006 Western Ave., Seattle
Pacific Industrial Products Co.
9th & Harrison Sts., Oakland, California

TRICO FUSE MFG. CO., Milwaukee, Wis.

PEOPLE
made this news

Miriam Jackson, Hawaiian Electric, Wins McCall Award

Top prize in the 1942 Laura McCall Award for home service went to the Hawaiian Islands. Miriam Jackson Emery, home service director of the Hawaiian Electric Co., Honolulu, won first prize, consisting of an engraved plaque and War Bond. Mrs. Edith T. Rauch, home service director of Puget Sound Power & Light Co., Seattle, was awarded second prize.

Given by *McCalls* magazine and administered by the Edison Electric Institute, the award is made in recognition of the work of utility home service departments in furthering the advancement of electrical living, promoting the national nutrition program and helping homemakers to adjust to wartime conditions. Decision was based on reports submitted by entrants covering (1) the planned 1942 wartime program of their departments; (2) activities to further electrical living and good will; (3) actual progress made in accomplishment of 1942 objectives; (4) summary of accomplishments of the average home service worker during the year.

This is the second successive year that a representative of a far western utility has received first prize, the 1941 contest having been won by Margarette Reinhart, Idaho Power Co.

● H. B. HODGINS, Westinghouse application engineer at Spokane since 1935, has been named manager of that office. Hodgins is a native of Moscow, Idaho and received his engineering degree from the University of Idaho in 1923, joining Westinghouse soon after. He was sent to the San Francisco office in 1925 and ten years later was appointed the company's representative at Coulee Dam.

● CARL L. HOFFMAN, supervisor of commercial sales, for the Washington Water Power Co., has been elected president of the Spokane Advertising and Sales Assn., and as such attended the advertising convention in San Francisco in June.

● Z. J. ATLEE, managing engineer of the vacuum tube department of the General Electric X-ray Corp., Chicago, received an honorary degree of Doctor of Engineering from his alma mater, Oregon State College, at the May 29 Commencement.

SALES MANAGER

Salary $10,000 to $15,000 per year. Position permanent. Necessary experience to qualify requires sales and engineering training plus executive experience. Age 40 to 49. All replies will be held strictly confidential. Write Box 76, Electrical West, 68 Post Street, San Francisco, Calif.

FORESTALL electrical breakdowns...

AS RECENTLY ANNOUNCED, *we are now building "Megger" instruments in this country, and are in production on the popular "Meg" and "Super-Meg" types. The acceptance accorded these new all-U. S.-made instruments has added to our already large backlog of orders, which we are now filling as rapidly as possible. Your orders for "Megger" instruments will be accepted according to priority ratings and with our assurance that delivery will follow as quickly as our further-expanding facilities will permit.*

...with the "MEGGER" tester!

Now, more than ever, it is vital to hold electrical failures to a minimum. Periodic testing of the insulation of motors, generators, cables, signal-control and other electrical apparatus can save priceless time and protect irreplaceable equipment. Testing with a "Megger" instrument is only a matter of minutes, but it can reveal potential damage and save days of costly delay.

"Megger" insulation testers are completely self-contained—wholly independent of batteries. Simply connect to the equipment under test, turn the hand cranked generator and read insulation resistance directly by the pointer over the scale. Over 40 years of service in industry has proved the value of "Megger" Practice.

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General Electric Advances Three Western Men

Changes in its Pacific Coast district office personnel were announced last month by General Electric Co. and were to be effective on July 1.

G. F. "Jeff" Maughmer, Phoenix manager since 1939, becomes assistant to the manager of the Pacific district, with headquarters in San Francisco. In charge of the Phoenix branch will be Loys Griswold, who goes there from Los Angeles. Arthur D. Bragg was transferred from San Francisco to the Los Angeles office, where he will be assistant to the manager.

All three men were graduated from Western institutions and took the G-E test course at Schenectady. Maughmer started with General Electric in 1923, following graduation from Washington State University. His service with the company has included several years in the publicity department at Schenectady, seven years in Los Angeles and 11 years at Phoenix.

Griswold, a graduate of the California Institute of Technology, has been with G-E since 1924. Following work with the International General Electric Co. in New York, he was transferred to Los Angeles in the industrial division.

Bragg, a Stanford graduate and with G-E since 1925, was engaged in engineering and commercial work in San Francisco for several years and in 1930 was sent to the Fresno office, where he remained for 10 years. Recently he had been handling special assignments at San Francisco.

GRISWOLD

● KURT STEINDORFF last month was appointed Pacific District manager of the resale section, industrial division, General Electric Co. With G-E for more than 29 years, Steindorff's work was interrupted for service in the Navy during World War I and on the Mexican border with the Army. Most recently he has been in the San Francisco office.

● INSTRUCTORS of electrical subjects in the University of California War Training courses for persons in industry include: S. N. Feldman, Pacific Electric Motor Co.; A. W. Flippin, W. N. Lindblad and C. R. Machen, Pacific Gas and Electric Co.; J. M. Dodds, Paul L. Dillon, Jesse C. Porter and Harvey A. Mylander, General Electric Co.; Noel E. Porter, Richmond Shipyard No. 1; John D. Hall, Standard Oil Co. of Calif.; J. H. Esselink, Moore Dry Dock Co.

BRAGG

Robinson District Chairman of Development Committee

Kinsey M. Robinson, president of Washington Water Power Co., has been named district chairman of the national committee for economic development, according to word from the regional committee for the Pacific Coast.

Under the national chairmanship of Paul G. Hoffman, Studebaker Corp. president, the committee membership includes Eric Johnston, president of Columbia Electric & Mfg. Co., Spokane and president of the U. S. Chamber of Commerce.

Purpose of the committee is:

"To have a satisfactory level of employment in the postwar period, America must provide in the neighborhood of 56,000,000 jobs, some 10,000,000 more than in 1940, as soon as possible after the war ends.

"To achieve this employment objective the nation must provide on a profitable basis an annual gross output of approximately $140,000,000,000 or 40% more than in 1940, when about $100,000,000,000 in goods and services were turned out.

"To aid in reaching these goals, American business must put on its own greatest industrial revolution—new designs and uses for products, new products, expanded markets and new markets developed all over the world."

MAUGHMER

Ebasco President Visits Western Properties

Sydney R. Inch, president of Ebasco Services, Inc. of New York, last month visited Western properties which subscribe to his company's consulting services. A pioneer Western utility executive, Inch began his career at the Big Hole station of a predecessor of the Montana Power Co. shortly after the turn of the century. He had just come from England.

In 1913 he came to Salt Lake as general superintendent of the Utah Power & Light Co. When he left the West for New York in 1923, he was vice-president and general manager of the Utah company. Purpose of his Coast trip was to study the operation of the Northwest power pool which links together plants and transmission lines of private and government-owned utilities in five Western states for the purpose of insuring adequate and reliable power supplies for war industries.

● WILLIAM H. BOOTH, chairman of the Edison General Electric Appliance Co. of New York, and HARRY J. BAUER, president of Southern California Edison Co., were honored by the University of Southern California at graduation exercises, held May 23, in Los Angeles. Both received the honorary degree of doctor of laws.

● JOHN F. LO SASSO, employed for the past eight years by the Cheyenne Light, Fuel & Power Co., has been commissioned as a lieutenant (J.G.) in the U. S. Navy. He reported May 29 at Camp Schuyler, New York, for training in an electrical engineering phase of the Navy's activities. He was also Secretary of the Cheyenne Engineers Club for three years.

OBITUARY

J. C. Gaylord

J. C. Gaylord, superintendent of hydro-generation for the Southern California Edison Co., died suddenly June 2, following a heart attack.

A veteran of 31 years of Edison service, Mr. Gaylord was one of the company's most capable engineering executives. He was prominent in engineering design work for many years, and made many contributions to the development of the company's substation and hydroelectric systems.

Born in Clinton, Conn., in 1884, Mr. Gaylord three days after his death would have attained his fifty-ninth birthday. He attended Throop Polytechnic Institute in Pasadena (now the California Institute of Technology) and the Massachusetts Institute of Technology, where he received a degree in electrical engineering.

He was assistant professor in electrical engineering at the University of Southern California from 1909 to 1912. On Aug. 1, 1912, he joined the Edison company as an electrical draftsman in the engineering department. He was made electrical designer six years later, and electrical division head in 1922. He became assistant electrical designing engineer in 1928, and engineer in the hydro division in 1932. He had been superintendent of hydro-generation since Feb. 1, 1940.

Robert E. Brown

Robert Emerson Brown, 46, Pacific Coast division manager for Electro Metallurgical Sales Corp. of New York, died May 26, at Belmont, Calif., following an illness of several months. Mr. Brown began his association with units of Union Carbide and Carbon Corp., in 1920, at Niagara Falls, N. Y. After a short time, he was transferred to the Pacific Coast. He had been division manager for Electro Metallurgical Sales Corp. since 1940 and was also district sales manager for the Electrode Division of National Carbon.

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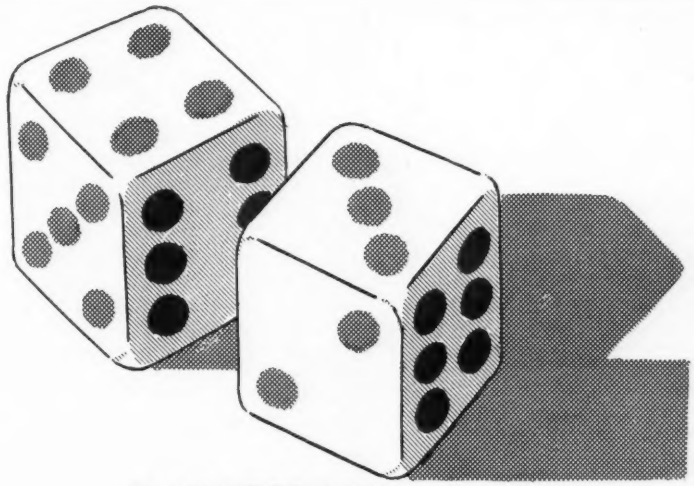

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By
ANGUS-CAMPBELL, INC.

Otto A. Frederickson

Otto A. Frederickson, development engineer for the National Electric Products Corp., Pittsburgh, Pa., and well known in the West, died on June 5 in St. Mary's Hospital, Orange, N. J., after a short illness. He was 50 years of age.

A native of Plainfield, N. J., Mr. Frederickson obtained his early experience as a draftsman for E. W. Bliss Co. While associated with that organization he helped design the dies for producing "Wiremold," which was then manufactured by the American Conduit Co. He was retained by the American Conduit Co. and made superintendent of the plant at New Kensington, Pa.

In 1920, when the Wiremold Co. was organized and the plant for the manufacture of the metal molding was moved to Hartford, Conn., Mr. Frederickson was made superintendent of the Hartford plant. It was in 1927 that he joined National Electric Products Corp. at Pittsburgh, becoming the development engineer for the company.

TRADE *notes*

Spokane Firm Expands Manufacturing Facilities

Columbia Electric and Mfg. Co., of Spokane, is expanding its manufacturing facilities and is taking over an additional building at W. 1224 Ide Ave. Its present factory building at S. 123 Wall will henceforth be used exclusively for the wholesale distribution of electrical merchandise. All manufacturing equipment will be moved to the new location and the staff increased from 137 men to at least 250, according to Walter A. Toly, manager of the manufacturing division of the company.

Toly adds that a great increase in demands for the company's product on the part of the navy, has made the expansion necessary. The new building will give four times the space.

Eric A. Johnston of Spokane, nationally known in his capacity as president of the United States Chamber of Commerce, is president of the Columbia Electric and Mfg. Co.

● H. J. SAYER & Co., LTD., electrical contractors and engineers, 744 West Hastings Street, Vancouver, recently was incorporated with authorized capital of $10,000.

Joshua Hendy Makes Production Record

Employees of the Joshua Hendy Iron Works, Sunnyvale, Calif., celebrated Memorial Day by delivering to the Maritime Commission the largest number of marine engines ever produced in a single day by any firm in the United States, it has been announced by Charles E. Moore, president of the company. These engines will power more than 50,000 tons of vessels now being built on the Pacific Coast.

The delivery included four 2,500-hp. engines for Liberty ships; one 2,750-hp. engine for a corvette and one 4,000-hp. turbine and reduction gear assembly for a C-1 cargo vessel. Total value was approximately $750,000.

Production line methods are being used by the firm to exceed delivery schedules on its war contracts.

New Welding Film Released By General Electric Co.

General Electric Co. has announced a new all-color sound movie, *The Inside of Atomic-Hydrogen Arc Welding*. Like its predecessor, *The Inside of Arc Welding*, the movie was produced by the Raphael G. Wolff Studios under direction of the G-E welding laboratories.

In two parts, the film is available to public, private and industrial welding schools and other groups. It instructs by means of charts, animation, expert demonstrations, and by examples of good and bad welding. Each part runs ten minutes and can be used only on sound-equipped 16-mm projectors.

● Railway and Industrial Engineering Co. of Greensburg, Pa., manufacturers of hi-pressure contact switching equipment, announces the appointment of Garland-Affolter Engineering Corp. as sales representative on the West Coast. Offices are located as follows: San Francisco — 420 Rialto Bldg.; Los Angeles—Room 366, 124 W. Fourth St.; Seattle—532 First Ave., S.; Portland—1233 NW 12th Ave.

● Production has now been increased at the plant of the Langley Manufacturing Co., Ltd., Granville Island, Vancouver, according to M. Davies, British Columbia and Alberta manager. This firm is owned by the Amalgamated Electric Corp., Toronto. Davies states the company has installed additional equipment, practically doubled its manufacturing space and is increasing its working personnel.

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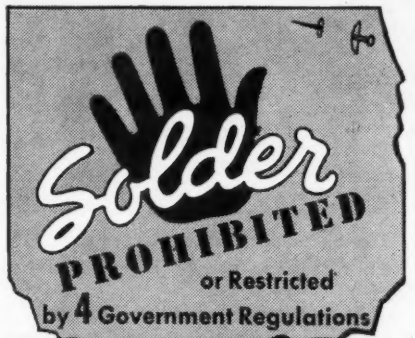

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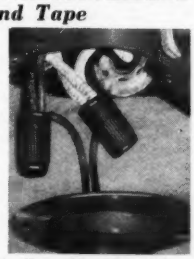

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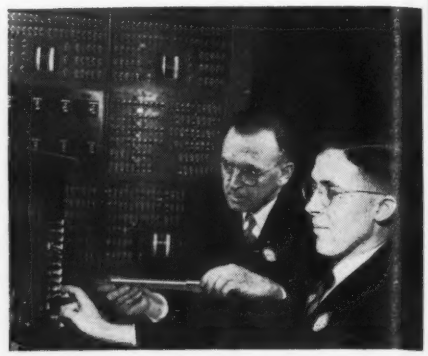
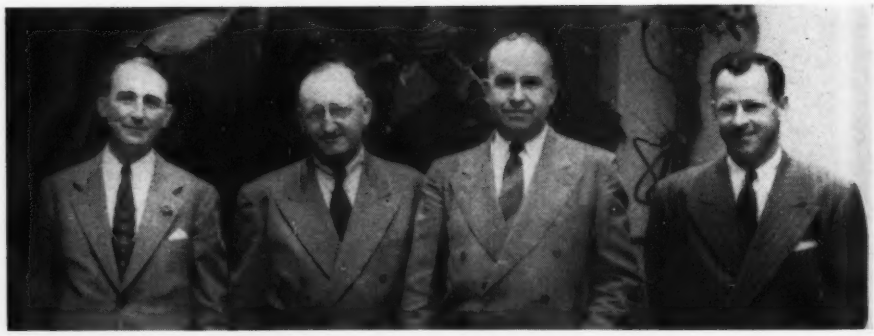


William R. Johnson (right) and Arthur Scott, Pacific Gas and Electric Co. assistant engineers, shown at East Pittsburgh, Penn., analyzing the PG and E power system on the Westinghouse a-c network calculator. Part of calculating board in background. Panels resemble telephone switchboard and, by adjustment of the myriad of plugs, dials and switches, any power system in the world can be set up in miniature. Coils and condensers represent the generators, transformers, transmission lines, loads

At the NEWA meeting in Santa Barbara last month (left to right): George Curtis, Smoot-Holman Lamp Co.; J. A. Kahn, Rocky Mountain district manager, General Electric Co.; M. C. Hixon, G-E lamp department



United States Rubber Co. delegation to the NEWA conference (left to right): Fred D. Benz, Pacific Coast manager, wire and cable division; F. E. Staible and H. F. Johnson of the New York office; Jack Milne, San Francisco office

Alex Kuehlthau, West Coast district manager, and Gerald Huelett, vice-president in charge of sales for Electrochef, Inc., Detroit, with Paul Rice, Leo J. Meyberg Co., San Francisco, at the recent PCEA meeting

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EXCERPT from a letter from Africa . . .

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What to do. Arrange for an individual blood donation at your nearest Red Cross Chapter or come as a group, as many clubs, churches, labor unions and fraternal organizations have done.

Why you MUST come to San Francisco or Oakland! Blood procurement centers must be located near dried blood laboratories. There are only nine such laboratories in the United States. California has two of these—one in Berkeley—one in Los Angeles.

Cut out and mail in the coupon appearing below. You will get a prompt reply. If you live some distance away from the Bay area, you can use the coupon, make arrangements through your local Red Cross, or phone for an appointment. Northern California must not fail in its weekly quota of 5000 Blood Donors.

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IN A SUBMARINE

AND IN A MODERN HOME

Photogrpah by Dick Whittington

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Equally dependent on electrical service is the modern home. Here it is equally important that wiring be adequate. Otherwise, electricity cannot deliver all the service it is prepared to render. For maximum service from modern appliances and equipment, home wiring **must** be adequate.

The time to talk adequate wiring is now, while thousands are thinking, planning, for the home of tomorrow. To talk intelligently, effectively, write today for full details to

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